A TEST OF A PNEUMATIC ASH HANDLING SYSTEM

BY

G. A. GRASSBY

A. P. STRONG

ARMOUR INSTITUTE OF TECHNOLOGY

1914

621.183
St 8

ILLINOIS INSTITUTE OF TECHNOLOGY
CHICAGO

Illinois Institute
of Technology
UNIVERSITY LIBRARIES

AT 349
Strong, A. P.
A test of a pneumatic ASH
handling system

For Use In Library Only

" A TEST OF A PNEUMATIC ASH HANDLING SYSTEM "

A THESIS

presented by

ARTHUR POOLE STRONG

and

GEORGE ARMITAGE GRASSBY

to the

PRESIDENT AND FACULTY

of

ARMOUR INSTITUTE OF TECHNOLOGY

FOR THE DEGREE OF

MECHANICAL ENGINEER

Having fulfilled the prescribed requirements

May 28, 1914

ILLINOIS INSTITUTE OF TECHNOLOGY
PAUL V. GALVIN LIBRARY
35 WEST 33RD STREET
CHICAGO, IL 60616

SUBJECT

A test of a pneumatic ash handling system.

OBJECT

There is very little known concerning the distribution of power and capacity losses and the laws governing such losses in the handling of ash by air. This thesis will therefore be devoted to a test of a commercial installation to determine and to classify for future reference these losses as well as may be done from one independent or isolated system.

DESCRIPTION OF APPARATUS AND PARTS OF SYSTEM.

Every commercial device for the removal of coal ash from boiler installations should meet the following requirements:

(1) Continuos service (free from frequent break downs)

(2) A minimum power consumption per ton of material handled.

(3) Adaptabilaty to varying conditions.

(4) A minimum maintainance charge.

(5) Cleanliness of premises after removal has been affected.

(6) Accessability to all parts liable to wear.

(7) A minimum of labor per ton of ash removed.

(8) Simplicity of operation.

26875

Conclusion

A best of a powerful reconstruction [illegible].

(1)

There is very little known commercially the [illegible] of power [illegible] Torque and [illegible] [illegible] such labors in the handling of [illegible]. This [illegible] will therefore be devoted to a [illegible] of a commercial [illegible] available to [illegible] and to [illegible] for future [illegible] where these labors or [illegible] [illegible] one [illegible] dependent on [illegible].

[illegible]

Any commercial device for the removal of coal [illegible] from boiler installations should meet the following requirements:

(a) Construction service free from frequent [illegible]

(b) A minimum power consumption [illegible] of [illegible] [illegible].

(c) Adaptability to varying conditions.

(d) A [illegible] maintenance charge.

(e) Elimination of [illegible] after removal has been effected.

(f) Accessibility to all parts [illegible] to [illegible].

(g) A minimum of labor [illegible] for [illegible].

(h) Simplicity of operation.

The pneumatic system meets all these requirements more nearly than any other system that has yet been de vised. Reference to the accompanying photographs depicts, (1) The 8" conveyor pipe and hopper inthe basement lined up in front of ash pit: (2) The connection of these pipes to the ash storage tank: (3) The 18" galvanized air pipe leading from the ash storage tank to the DUST COLLECTOR. (4) The positive relief valve for use with a positive exhauster. (5) The belt driven positive exhauster and motor (6) The air discharge from exhauster to the atmosphere. (7) The spray nozzle and section of same used for settling the dust and quenching the red hot ash before it enters the storage tank: (8) The three-way cock automatic drain and spray water control for spray water to spray nozzle.

ARRANGEMENT OF APPARATUS AND SYSTEM

The accompanying blue prints are the contractors drawings for the installation of the PNEUMATIC ASH HANDLING SYSTEM showing respectively the plan and elevation. Indicated on the south run of the 8" conveyor pipe in red line are the location of points at whish surveys were made of the inside of the pipe with a pitot tube measuring vel ocity and pressure. In the elevation on the 18" galvanized air pipe is shown,by red line the point of taking the sur vey of the inside of the air pipe,measuring velocity and pressure. On top of the ash storage tank is indicated in red the plate orifice and discharge chamber for same.

[illegible]

This was used for measuring the air friction loss in the conveyor pipe.

At hoppers marked A - B - C - D the conveyor pipe line was opened by removal of ash intake hopper plug and air and ash taken in for RUNS A - B - C - D respectively.

Plate 338 indicates the method of supporting the ash preparatory to being fed into the ash intake hopper. This platform was so arranged that tha direction of the flow of ash, when fed to the intake was the same as in the con veyor pipe.

Plates 103 to 111 inclusive show the direction of progress of the pitot tube across the pipe and the relative angles between such diameters of progress.

Plate 339 indicates wiring for measuring power con sumption of motor.

Plate 340 shows plate orifice and discharge chamber.

Plate 99 shows typical differential mercury gauge and pitot tube connections.

Plate 99 shows the Gebhardt Pitot Tube used for all velocity and pressure measurements in the pipes.

METHOD OF PROCEEDURE

In the manufacture of the Pneumatic Ash Handling System and its successful operation it is essential that the engineer in charge of the design and arrangement know the weight per cubic foot of ash handled, the total weight of ash to be handled per day and the time that can be allotted for each separate removal of the ash from the pits.

[illegible]

[illegible]

[illegible]

These facts determine the terminal pressure to be used and the capacity per minute of the systems, which in turn togather with the length of pull and number of elbows de termines the blower pressure to beused and hence the power required.

With these requirements of operation in mind it was therefore essential that a proceedure be adopted that would duplicate actual operating conditions as near as possible. The capacity guarantee on this particular installation being 250# of ash per minute it was determined to operate the exhauster at such a speed that would handle this quantity without choking the conveyor pipe. The blower was operated at the speed required to handle a weighed quantity of ash per minute and the following readings taken:

(1) Power consumption at motor.

(2) R.P.M. of motor.

(3) R.P.M. of blower.

(4) Vacuum at exhauster.

(5) Time interval.

Having thus determined a definite r.p.m. for the blower for RUNS A - B - C - D in accordance with the above, it was necessary that the vacuum and velocity be measured at the blower and at intervals along the conveyor pipe line when no ash was being handled so as to indicate the con ditions in the pipe that would creat the proper conditions of velocity and pressure of air, when handling ash, to con vey the rated quantity.

[illegible]

[illegible]

[illegible]

[illegible]

(1) Power communication at [illegible].

(2) [illegible] of motors.

(3) [illegible] of lighting.

(4) Transport [illegible].

(5) Line [illegible].

[illegible]

[illegible]

[illegible]

[illegible]

Therefore for run A the blower was operated at run A speed and pressure and velocity of the air in conveyor pipe measured along diameters indicated in plates 103 to 111 inclusive and at intervals of one tenth the diameter of the pipe. Air was admitted to the pipe at hopper A. The vacuum at the blower, r.p.m. of blower and motor and power consumption of motor as indicated by volt and ammeter readings, were all taken at five mimute intervals during the measurements of vacuum and velocity in the conveyor pipe. The voltage at the motor was maintained fairly constant by regulation of the generators in the generator station close at hand, thru the kindness of the operating engineer. This proceedure was repeated for RUNS B - C - D. In run D the vacuum at point (1) was increased over that of RUN A at point (1) by speeding up the blower.

Having thus surveyed the air conditions in the 8" pipe the blast gates were closed in both lines of pipe and the plate orifice attached to the ash storage tank. The size of this orifice was varied until the blower conditions were duplicated for the several different runs. At each setting of the orifice the velocity and pressure was measured in the 18" air pipe on the several diameters at intervals of 1", the temperature of air outside and inside the orifice, and the pressure inthe orifice discharge chamber. Readings were taken on motor and blower as before. The amount of work done in expanding the air thru the orifice in each instance is equal to the friction loss in

expanding the air in the 8" pipe for the corresponding runs.

The standard prony brake test was used in determining the commercial efficiency of the motor.

APPLICATION OF THE FORMULA $V = \sqrt{2gH}$ FOR THE DIFFERENTIAL MERCURY GAUGE USED IN MEASURING VELOCITY AND VACUUM HEADS IN 8" PIPE.

$V = c\sqrt{2gH}$ where $c = 1$
g = gravity
H = column air at same temp. and pressure as air in pipe.

To reduce reading on the differential mercury draft gauge to equivalent feet of air at pressure and temp. of air in pipe.

Calibration differential mercury gauge.

Reading gauge (h)	Reading C/M "U" Tube gauge.
6.0	1.6

Therefore:

$$\frac{1.6}{30.5 \times 6.0} h = \text{equivalent height in feet of mercury column.}$$

Let W_1 = weight pounds per cubic foot air at 14.7 and 273 deg. cent. abs.
W_2 = weight pounds per cubic foot air at P_2 and T_2

P_2 = pressure pounds per sq. in. abs. air in pipe.

T_2 = temp. centigrade abs. air in pipe.

Therefore:

$$\frac{W_2}{W_1} = \frac{P_2 \quad 273}{14.7 \quad T_2} \qquad W_1 = .0864$$

[illegible]

[illegible]

[illegible]

$$W_2 = \frac{.0864 \times 273}{14.7} \frac{P_2}{T_2}$$

Weight column mercury one sq.ft.cross section and height equivalent to gauge reading

Weight cu.ft.mercury @ 60°F = 846.8 #

$$\frac{846.8 \times 1.6}{30.5 \times 6.0} h_v = \text{Weight mercury column.}$$

h_v = reading on gauge denoting velocity head.

Feet of air column H

$$H = \frac{846.8 \times 1.6}{30.5 \times 6.0} h_v \frac{14.7}{.0864 \times 273} \frac{T_2}{P_2}$$

$$P_2 = 14.7 - \frac{1.6 \times 846.8}{6 \times 30.5 \times 144} h_p$$

h_p = reading gauge denoting vacuum in pipe.

$$P_2 = 14.7 - .0515\, h_p.$$

$$H = \frac{846.8 \times 1.6}{30.5 \times 6.0} \times \frac{14.7}{.0864 \times 273} \times \frac{h_v\, T_2}{14.7 - .0515\, h_p}$$

$$H = \frac{4.62}{.0515} \frac{T_2\, h_v}{(285.5 - h_p)}$$

$$V = \sqrt{2g} \sqrt{\frac{4.62}{.0515} \frac{T_2\, h_v}{(285.5 - h_p)}}$$

$$V = 76 \sqrt{\frac{T_2\, h_v}{285.5 - h_p}}$$ = velocity air in 8" pipe, feet per second.

<u>APPLICATION OF THE FORMULA $V = c\sqrt{2gH}$ for the DIFFERENTIAL MERCURY AND WATER GAUGES USED IN MEASURING THE VACUUM AND VELOCITY HEADS RESPECTIVELY IN 18" AIR PIPE.</u>

$$V = c\sqrt{2gH}$$

Reading on Ellison gauge in inches of water

Let h = reading gauge

$$\frac{h}{12} = \text{feet of water.}$$

W_1 = weight pounds per cu.ft.air at 14.7 and 273° C

W_2 = " " " " " " " P_2 and T_2

P_2 = pressure pounds per sq.ft. abs. air in pipe

T_2 = temp, cent. abs. in pipe.

Therefore

$$\frac{W_2}{W_1} = \frac{P_2}{14.7}\,\frac{273}{T_2} \qquad W_1 = .0864$$

$$W_2 = \frac{.0864 \times 273\ P_2}{14.7\ T_2}$$

Weight column water one sq.ft.cross section and height equivalent to gauge reading.

Weight cu.ft. water @ 60° F = 62.5 #

$$\frac{62.5}{12}\ h_v$$

h_v = reading on gauge denoting velocity head.

$$\frac{62.5}{12}\ h_v\ \frac{14.7\ T_2}{.0864 \times 273\ P_2} = \text{feet air golumn.}$$

From mecury differential gauge,

$P_2 = 14.7 - .0515\ h_p$ $\quad h_p$ = reading gauge denoting vacumn in pipe.

$$H = \frac{3.246\ T_2\ h_v}{\cancel{XXXX}\ .0515\ (285.5 - h_p)}$$

$$V = \sqrt{2g}\ \sqrt{\frac{3.246\ T_2\ h_v}{.0515\ (285.5 - h_p)}}$$

$$V = 63.7\ \sqrt{\frac{T_2\ h_v}{285.5 - h_p}}$$ = velocity air in 18" pipe feet per second.

POWER LOSS IN 8" CONVEYOR PIPE.

Allother conditions being the same,if the conveypr pipe is blocked off and the air taken thru an orifice that otherwise would go thru the conveyor pipe and some means adopted to measure the amount of air passing,also the energy dissipated,then we have a means of determinigg the power loss in the 8" conveyor pipe,inas much as the orifice takes the place of such pipe.

The amount of air passing can be determined by pitot tube readings in connection with temperature readings of the air passing.

Assuming that the expansion thru the orifice is adi abatic,then if the atmospheric temperature T_1 the throat temperature T_2 the discharge pressure P_2 and the atmospheric pressure P_1 is secured,the energy per cu.ft. of air pass ing can be obtained.

The formula covering work dissipated in the adiabatic expansion of air is,according to Peabody's Thermodynamics page 65.

$$\text{Work} = \frac{P_1 V_1}{k-1}\left(1 - \left(\frac{V_1}{V_3}\right)^{k-1}\right) \text{ ft.pds.}$$

where $k = 1.405$
V_1 = Volume air at atmospheric temp,and pressure.

V_3 = Volume air at discharge pressure and threat temperature.

[illegible] " [illegible]

[illegible] conditions [illegible] the [illegible] [illegible] [illegible]

DETERMINATION OF MEAN EFFECTIVE PRESSURE AND VELOCITY IN PIPE

The velocity and vacuum heads as read for the different positions in any one cross section of the pipe are more or less irratic due to local eddys in the air and also to the throatling effect of the pitot tube on the passage of air. Therefore the first step in the determination of mean effective values is to equalize and average the pitot tube readings on a given diameter by drawing an average curve thru the points as plotted with diameter as abscissa and pitot tube readings as ordinates see plates 112 to 138 ; 139 to 159 ; 160 to 174 ; 175 to 201 ; inclusive.

The values as read from these curves will then have eliminated as much as possible the effect of the eddy currents of air, and therefore can be used to compute the actual velocity and vacuum at these locations. The mean effective velocity is such a velocity that when multiplied by the cross section area of the pipe will give the corect volume of air flowing per unit time. It is thus evident that the velocities nearer the wall of the pipe effect a greater area of the cross section than do the velocities at or near the center of the pipe.

Referring to Fig. (1) the area of the inner circle is $\left((x_2 + dx)^2 - x_2^2\right)\pi$.

[illegible]

[illegible]

[illegible]

Area of the outer circle is $\left((x_2 + dx)^2 - x_2^2\right)\pi$. As dx approaches zero the area of each ring approaches zero and the length of the center line of these rings approaches the length of the circle $2\pi x_2$ or $2\pi x_1$ as a limit. Therefore with an infinite number of rings each with dx = 0, the ratio of the areas of any two such rings will be as their radii. Hence the areas affected by any number of velocities will vary as the radii of the rings at which such velocities were taken. So, to give the proper weight to each velocity that an average may be taken they must be plotted with the square of the radii as abscissa and the velocities as ordinates. See plates 218 to 244; 245 to 265; 266 to 280; 281 to 307; 308 to 324;.

The area under these curves integrated and divided by the length of base then gives the mean effective value of ordinates. The same reasoning applies to the vacuum readings. The average of these mean effective values which determine for each diameter will thus give the mean effective value for the pipe at that particular cross section.

SELECTION OF AN EMPIRICAL FORMULA GOVERNING THE FLOW OF AIR IN PIPE.

The formula deduced in Peabody's Thermodynamics page 383, is based on Bernoulli's Theorem for flow of fluids in pipes, and applied for air is as follows:-

$$P_1 = P_2 \left(1 - \frac{Su_2^2 L}{gRTm}\right)^{\frac{1}{2}}$$

P_2 = final pressure

P_1 = inital pressure

S = constant

u_2 = velocity corresponding to pressure P_2

L = length of pipe feet.

g = gravity = 32.2

$R = \frac{P_o V_o}{T_o}$ at atmospheric condition = 53.35

T = absolute temperature atmosphere.

m = mean depth = $\frac{\text{area}}{\text{perimeter}}$

= 1/4 d for cylindrical pipe.

Substituting we have

$$P_1 = P_2 \left(1 - \frac{S\, u_2^2\, L}{430\, T\, d} \right)^{1/2}$$

The values of all the terms in this equation are known with the exception of S which is a constant and therefore its value can be determined and an average secured for any one set of conditions. Thus with a con stant determined, it is possible to calculate the flow of air in pipe, both as regards quantity and pressure.

DETERMINATION OF THE HORSE POWER REQUIRED TO DRIVE A POSITIVE BLOWER. (FRICTION NEGLECTED)

Referr to plate 327-8. At any position in the rotation of the impeller there is either a pressure V or A acting to either assist or retard the rotation. These pressures acting on a curved surface have for their effective area, the projected area of this surface. If

P_1 = Total pressure

P_r = Total pressure

γ = constant

μ = relative [illegible] to [illegible]

L = Length of [illegible]

ρ = density = [illegible]

θ = $\frac{[illegible]}{[illegible]}$ at atmospheric [illegible] = [illegible].

T = absolute temperature [illegible].

m = mass [illegible] = $\frac{[illegible]}{\text{weight}}$

= [illegible] for [illegible] [illegible].

[illegible] then we have

$$P_1 = [illegible] \left\{ [illegible] - \frac{[illegible]}{[illegible]} \right\}$$

The [illegible] of all the terms in the [illegible] [illegible] with the exception of [illegible] have constant [illegible] therefore its value can be determined [illegible] [illegible] for any one set of conditions. [illegible] [illegible] [illegible], it is possible to calculate the [illegible] air in pipe, both as regards quantity and pressure.

[illegible]

[illegible] (Reference [illegible]).

Suppose to [illegible] [illegible]. [illegible] [illegible] [illegible] rotation of the impeller [illegible] [illegible] [illegible]

these projections are taken along ~~XXXXX~~ axes perpendicular to each other and passing thru the center of the impeller then the turning moment due to such pressure is the product of the projected area, the pressure per unit area, and the lever arm of such area, which is the distance center of shaft to C.G. of projected area. The integration of the summation of all these turning moments for an entire revolution divided by the length of base of such an equation will then give the mean effective turning moment. This moment applied in the equation for horse power then gives the power required to drive the blower against a definite pressure. These moments with the pressures omitted are shown in plate 329 and the plot of such moments and the mean effective moment shown on plate 329. This moment applies for only a definite cross section of impeller.

The formula for the theoretical horse power to drive a positive blower (friction neglected) is as follows:

$$H.P. = \frac{2 \times C \times R.P.M. \times l \times p}{33000}$$

where, C = constant = $9.81 = \frac{58.875 \times 2}{12}$

l = length case in inches.

p = vacuum below atmospheric in pounds.

DISCUSSION

The data herein given depends for its reliability on the accuracy of the instruments used in indicating the exact conditions which they are designed to measure. The measurement of air flow is one of the most difficult to do and do rightly. The eddy currents are many and usu ally cause erratic and improbable readings. The instru ment with which the air measurements were obtained is known as a "Gebhardt Pitot Tube". This is a refined pitot tube especially adapted for measuring high velocities. The static and dynamic tube are contained in a larger shell or casing made of 1/4" outside diameter tube. The entire tube portion is so apportioned that it can be pass ed thru a 1/4" (full) hole. It will therefore be seen that the obstruction to the flow of air offered by the tube is a minimum. The resulting eddy currents are there fore reduced to a minimum. In order to minimize personal errors of observation and also to average up the static and dynamic readings of the pitot tube so as to give an average condition of velocity and pressure at all points in the pipe, readings were taken on four diameters at approximately 45° to each other. At points nos. (1) to (5) inclusive in the 8" pipe only three diameters were possible due to building obstructions. The readings thus taken were therefore sufficient in number to reduce to a minimum errors due to eddy currents or personal observation.

By first plotting the field readings and drawing an

average curve thru such points these errors were further minimized and caused to compensate each other. Only readings taken from such curves were used for the calculation of results; hence the lack of erratic results in the final derived data.

##########

The means adopted for the measurement of the energy loss in the 8" conveyor pipe was original with the writers of this thesis and although the expansion of air thru the plate orifice may or may not be strictly adibatic yet such expansion was near enough to the actual to give results that were within the limits of accuracy of the other parts of the test. When the air was expanded thru the 8" conveyor pipe its expansion was not adiabatic because of the immense radiating surface of the pipe,yet the errors introduced in assuming that it was an adiabatic expansion are of such a small percent that they can be safely neglected. The results obtained are well within the scope of practical accuracy.

##########

The actual power required to drive the exhauster was in each case between 10 and 20 percent more than the theoretical power which neglected friction. The many influences tending to increase the friction load on the blower, such as a sprung case, poorly alligned bearings,a hard place in the brass bushings,etc, make it impossible to determine acurately any formula for the fristion other than to say that it is between 10 and 20 percent of the theoretical H.P.

The efficiency of a positive blower is uaually spoken of as the ratio between the free air handled and the gross displacement of blower per minute,regardless of the pres sure at which the exhauster is operating. While this eff ciency is allright for hurried and approximate calculations yetwhen it is desired to determine the r,p.m. and hence the size of a blower for any one installation, the effi ciency should be the ratio between the air handled at the pressure of the intake side of the blower and the gross displacement of the blower per minute. In short the eff iciency of the blower is a measure of the slippage or leakage. This naturally varies for different pressures and speeds. A curve should therefore be maintained show ing these various efficiencies. In as much as the ratio between the clearance area of impeller and case,and the displacement per revolution remains fairly constant for all sizes of positive blowers,in general such efficiencies may be used for general figuring.

The data herein given indicates that as the speed of the exhauster is increased its efficiency ~~from data here~~ is also increased, hence in figuring efficiency from data herein given corrections must be made for speed variation as per the accompanying curve sheet 330, "Leakage-Curve".

All the exhauster data has been deduced to the data shown on curve sheet 331 which indicates that the smaller the displacement of the exhauster the less power it takes to drive it to deliver a definite amount of air at a def

inite pressure. In the manufacture of positive exhausters the impeller is cast with a core and theh placed in a special planer and the contact surface finished to template. This process results some times in the impeller being out of balance more than can be taken care of by filling etc. So it is uaually found practical to operate a positive blower not beyond 275 to 300 r.p.m. and usually less than 300 r.p.m. The vibration of the machine at higher speeds soon racks the case and makes necessary its overhauling. This vibration is not all due to the possible unbalance of the impeller but partly to the constant releasing of pressures of air from one direction and applying it in theother direction as the impeller passes from vacuum to atmosphere and vise versa. This happens four times per revolution. Such vibration makes itself felt in a vertical exhauster more than in a horizontal. In the vertical exhauster the vibrations are from side to side,parallel to foundation or floor line,while in the horizontal they are up and down perpendicular to foundation or floor line.

\#\#\#\#\#\#\#\#\#\#\#\#

The carrying capacity of the pneumatic system for handling ashes is determined by the amount of air passing thru the pipe per unit time and its velocity. The air first must have a definite in order not to allow the ash to drag on the bottom of the pipe or lag at the elbows. This velocity varies for the different weights per cu.ft.

of ash. With this velocity the amount the amount of ash carried varies directly with the quantity of air passing, each cubic foot being capable of holding in suspension a definite bulk of ash of a given weight per cu.ft. In sh ort the air in the pipe has a"saturation point" beyond which if any more ash, if deposited in the pipe, will drag on the bottom. This dragging tends to decrease the effec tive transverse area of the pipe and so the amount of air flowing is decreased accompanied by a dropping of more ash from the air until the saturation point is reestablished. Then a balance is struck and if no more ash is fed into the pipe the air will gradually pick up the ash in the bottom of the pipe and the system will clear itself of a so called "plug". It is difficult in practice to feed the ash so that the saturation point is maintained for any length of time without overstepping the mark and caus ing a "plug". So the practice is adopted of guaranteeing a carrying capacity 20 or 25 percent less than the satur ation point. Many times the difference between success and failure in the operation of a pneumatic system is the inability of the operators to appreciate the fact that the greatest capacity can be obtained by a constant and steady feed rather than an irregular and intermittent feed especially when such irregularity oversaturates the air.

DERIVED FORMULA OR CURVES.

(1) Pressure loss in 8" conveyor pipe.

$$P_1 = P_2 \left(1 - \frac{S \; u_2^2 \; L}{430 \; T \; d} \right)^{1/2}$$

Where,

P_1 = terminal pressure.

P_2 = pipe pressure.

S = constant.

u_2 = velocity feet per second at P_2

L = length of pipe in feet.

T = abs, temp. atmosphere.

d = diameter pipe feet.

Values of S

Horizontal Run.		Vertical Run.	
Terminal vacuum (oz.)	"S"	Elbow Vacuum (oz.)	"S"
7.00	.001522	11.85	.002780
5.80	.001771	10.00	.002236
		8.00	.002323
		14.55	.001858

(2) Energy loss in 8" pipe.

$$W = \frac{P_1 \; V_1}{k - 1} \left(1 - \left(\frac{V_1}{V_2} \right)^{k-1} \right) \text{ foot pounds per minute.}$$

Where,

k = 1.405
P_1 = absolute pressure atmosphere.
V_1 = volume free air handled per minute.
V_2 = volume air blower pressure per minute.

(3) Carrying capacity air at same intake pressure, at different distances from vertical riser.

See Curve 337 .

(4) Power to drive exhauster. (W & G section as shown)

$$\frac{2\pi \times C \times r.p.m. \times l \times p}{33000} = \text{Horse Power}$$

Where,

C = constant = 9.81

l = length case in inches.

p = vacuum below atmospheric in pounds.

CONCLUSIONS

The pressure loss in the 8" pipe is for all practical purposes a straight line loss dividing itself into two distinct divisions; horizontal and vertical runs: For horizontal runs with an initial pressure of 5.5 oz. 20 ft. per oz. loss: For vertical runs 12 ft. per oz. loss.

For an initial pressure of 7.0 oz. 16 ft. per oz. loss for horizontal and 10 ft. per oz. loss for vertical.

The energy loss in 8" pipe does not bear at all on the operation of the system. It is however the minimum limit to which the H.P. required by the exhauster to exhaust the air may be reduced. This would mean a 100 % efficient driver and exhauster, which is evidently impossible.

##########

The power sheet of exhauster data indicates that the smaller the displacement of the exhauster the less power is required to handle a definite amount of air at definite pressures. It is also apparent that the less the displacement per revolution the greater the speed at which the exhauster must operate. Due to mechanical difficulties the speed of the exhauster is limited hence the minimum sized blower used is limited. An endeavor should however be made to always use the smallest size blower possible, within the limitations of good practice. The efficiency used to determine the size of blower should be based on the gross displacement of the blower per minute and the cu.ft. of air to be handled at blower pressure.

##########

The longer the distance between elbows,or intakes and elbows, the greater the velocity attained by the ash,hence the greater the retarding effect of the impingement of ash on elbow to the flow of the ash. The shorter the distance the less the retarding effect up to a certain distance,at which the retarding effect is zero and the ash instead of rebounding glances around the elbow and on. At this distance the capacity of the system is a maximum. The curve indicates such a distance to be 50 ft. from elbow at base of vertical riser. For distances less than 50 ft. the ash has not attained a sufficient velocity to glance around the elbow and so lags behind. the nearer the point of feed

[illegible]

[illegible]

[illegible]

to the elbow the less the capacity of the system. About 20 ft. is the nearest that will give satisfactory operation.

Respectfully Submitted

A. P. Strong Class 1909

H. Grassby Jr. Class 1909

RUN 4

FIELD DATA

POINT 1

Zero Reading .0

Diam. Feet	Horz.Diam. Static Head	Horz.Diam. Vel. Head	Vert.Diam. Static Head	Vert.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head
.017	6.40	1.80	6.50	1.50	6.60	2.05		
.067	7.10	3.10	7.10	3.00	7.00	2.90		
.117	7.10	3.60	7.20	3.60	7.30	3.50		
.167	7.13	4.00	7.50	4.15	7.45	3.90		
.217	7.26	4.10	7.75	4.50	7.50	4.30		
.267	7.30	4.20	7.80	4.80	7.50	4.65		
.317	7.30	4.30	8.00	5.10000	7.60	5.15		
.367	7.05	4.65	7.80	5.50	7.55	5.10		
.417	7.00	5.00	8.00	5.50	7.60	5.60		
.467	7.30	5.05	8.05	5.70	7.65	5.70		
.517	7.55	4.90	8.10	5.80	7.90	5.75		
.567	7.60	4.55	8.20	5.50	7.90	5.20		
.617	7.70	3.85	8.25	4.60	7.85	4.70		

Temperature air in pipe 29.5 degrees cent.
" " " room 28.0 degrees cent.

POINT 2

Zero Reading .0

.017	7.40	1.50	7.70	1.90	7.70	1.50		
.067	7.50	2.50	8.00	3.10	8.10	3.00		
.110	7.60	3.10	8.60	4.00	8.50	3.60		
.167	7.70	3.60	8.70	4.40	8.50	4.00		
.217	7.80	3.70	8.80	4.60	8.50	4.30		
.267	8.10	4.00	8.90	4.80	8.60	4.50		
.317	8.40	4.00	8.90	4.90	8.80	4.60		
.367	8.70	4.30	9.00	5.10	8.80	4.80		
.417	9.50	4.30	9.00	5.00	8.90	4.40		
.467	9.60	5.00	9.05	5.00	8.70	4.20		
.517	8.80	4.10	9.00	4.60	8.70	4.10		
.567	8.90	3.50	9.05	4.40	8.80	4.00		
.617	8.90	3.00	9.05	3.60	8.70	3.20		

Temperature air in pipe 30.0 degrees cent.
" " " room 31.0 degrees cent.

RUN A

FIELD DATA

POINT 3
Zero Reading .0

Diam. Feet	Horz.Diam. Static Head	Horz.Diam. Vel. Head	Vert.Diam. Static Head	Vert.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head
.017	10.30	2.45	10.20	2.00	10.00	1.80		
.067	11.65	4.05	11.70	4.60	10.86	3.85		
.117	12.25	5.45	12.50	5.60	11.20	4.80		
.167	12.35	5.90	12.66	6.05	11.60	5.15		
.217	12.55	6.45	12.75	6.65	11.70	5.75		
.267	12.30	6.30	12.90	7.00	11.80	6.10		
.317	12.60	6.75	13.30	7.50	12.10	6.10		
.367	12.45	6.75	13.85	7.85	12.10	6.10		
.417	13.15	6.75	14.00	7.75	12.50	6.20		
.467	13.45	6.25	13.15	4.00	12.25	6.05		
.517	12.80	6.00	11.80	1.30	12.30	5.70		
.567	12.90	5.65	10.90	1.70	12.15	5.25		
.617	12.50	5.00	11.85	2.10	12.00	4.65		

Temoerature air in pipe 29.5 degrees cent.
" " " room 39.5 degrees cent.

POINT 4
Zero Reading .5

.017	11.30	1.90	11.10	1.10	11.60	2.30		
.067	11.60	3.20	11.50	3.00	11.90	3.50		
.117	11.70	3.70	11.90	4.00	12.20	4.40		
.167	11.90	4.30	11.90	4.40	12.20	4.80		
.217	11.90	4.50	12.00	4.80	12.60	5.00		
.267	12.00	4.90	12.10	5.10	12.60	5.50		
.317	12.40	5.10	12.30	5.10	12.90	5.80		
.367	12.40	5.30	12.40	5.30	12.90	5.90		
.417	12.60	5.30	12.50	5.20	13.00	5.70		
.467	12.70	5.10	12.50	5.00	12.90	5.40		
.517	12.60	4.70	12.40	4.70	12.90	5.20		
.567	12.70	4.50	12.50	4.40	12.80	4.60		
.617	12.80	3.90	12.60	3.80	12.80	4.30		

Temperature air in pipe 37.5 degrees cent.
" " " room 35.5 degrees cent.

RUN A

FIELD DATA

POINT 5

Zero Reading .8

Diam. Feet	Horz.Diam. Static Head	Horz.Diam. Vel. Head	Vert.Diam. Static Head	Vert.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head.
.017			13.70	2.40	13.50	2.10	13.45	2.42
.067			13.45	2.75	13.90	3.50	13.96	3.35
.117			14.15	4.00	14.15	4.40	14.20	4.45
.167			14.20	4.50	14.55	5.00	14.55	4.70
.217			14.50	5.00	14.60	5.25	14.75	5.25
.267			14.40	5.45	14.62	5.60	14.85	5.70
.317			14.75	5.50	15.00	5.70	14.85	5.60
.367			14.80	5.50	15.20	5.95	14.90	5.70
.417			15.00	5.60	15.15	5.85	14.90	5.60
.467			15.00	5.45	15.45	5.80	15.15	5.60
.517			14.80	5.15	15 25	5.30	15.12	5.12
.567			14.60	4.80	15.25	5.05	14.90	4.80
.617			14.90	4.45	15.15	4.50	15.02	4.42

Temperature air in pipe 38.0 degrees cent.
" " " room 33.0 degrees cent.

POINT 6

Zero Reading .0

.017	13.00	1.00	13.70	.45	14.00	1.90	14.40	1.65
.067	13.10	1.65	14.15	1.85	13.80	2.45	14.45	2.05
.117	13.65	2.00	15.10	3.70	13.80	2.10	14.50	2.50
.167	13.70	2.15	15.20	3.85	13.90	2.00	14.95	3.45
.217	13.90	2.35	14.90	3.90	14.30	3.05	14.95	3.65
.267	13.90	2.40	14.20	2.50	14.60	2.90	15.00	3.75
.317	13.90	2.20	14.80	3.10	14.55	3.15	15.00	3.70
.367	13.85	2.15	15.10	3.80	14.60	3.30	14.85	3.65
.417	13.75	2.05	15.30	3.90	14.55	3.20	14 85	3.70
.467	14.00	2.15	15.20	3.85	15.00	3.65	14.80	3.55
.517	14.05	2.40	15.30	4.00	15.30	3.90	14.65	3.70
.567	14.10	2.40	15.05	3.95	15.25	3.85	14.70	3.55
.617	14.20	1.65	15.00	3.40	15.50	3.65	14.75	2.90

Temperature air in pipe 39.5 degrees cent.
" " " room 33.0 degrees cent.

RUN A

FIELD DATA

POINT 7

Zero Reading .26

Diam. Feet	Horz.Diam. Static Head	Horz.Diam. Vel. Head	Vert.Diam. Static Head	Vert.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head
.017	15.50	1.30	15.75	1.35	15.60	1.70	15.32	1.35
.067	15.55	2.40	16.00	2.50	15.90	2.75	15.65	2.35
.117	16.00	3.25	16.40	3.55	16.20	3.45	16.25	3.25
.167	16.30	3.65	16.55	4.00	16.50	4.30	16.40	3.95
.217	16.25	4.20	16.70	4.20	16.40	4.50	16.65	4.25
.267	16.65	4.25	16.65	4.45	16.45	4.10	16.90	4.40
.317	16.60	4.38	16.75	4.45	16.45	4.45	16.85	4.55
.367	16.50	4.30	16.80	4.55	17.00	4.60	16.90	4.45
.417	16.50	4.30	16.75	4.50	16.95	4.65	16.85	4.35
.467	16.65	4.10	16.85	4.40	17.10	4.65	16.75	4.15
.517	16.45	3.95	16.75	4.15	17.05	4.35	16.95	4.05
.567	16.70	3.75	16.85	3.75	17.05	4.20	16.90	3.75
.617	16.95	2.95	17.00	3.25	17.00	3.20	17.00	3.15

Temperature air in pipe 40.25 degrees cent.
" " " room 36.50 degrees cent.

POINT 8

Zero Reading .45

.017	19.85	1.85	19.80	1.90	19.60	1.23	20.15	2.25
.067	20.38	3.20	20.35	3.50	20.40	3.30	20.65	3.95
.117	20.80	4.80	20.90	4.35	20.70	4.10	21.00	4.70
.167	21.00	4.75	20.95	4.90	20.85	4.55	21.50	5.60
.217	20.95	5.00	21.10	5.25	20.88	4.90	21.65	6.00
.267	20.88	5.13	21.25	5.60	20.90	5.20	21.80	6.05
.317	20.90	5.30	21.15	5.85	20.95	5.15	21.80	6.55
.367	21.12	5.47	21.45	6.20	20.91	5.10	21.85	6.65
.417	21.00	5.12	21.35	5.75	21.05	5.14	21.85	6.35
.467	20.95	4.77	21.40	5.70	21.07	4.85	21.90	6.00
.517	20.85	4.30	21.20	5.15	21.10	4.55	21.70	5.30
.567	20.92	4.00	21.20	4.90	21.16	4.12	21.65	4.90
.617	20.90	3.30	21.40	4.23	21.10	3.48	21.62	4.28

Temperature air in pipe 38.5 degrees cent.
" " " room 37.0 degrees cent.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

RUN B

FIELD DATA

POINT 3
Zero Reading .7

Diam. Feet	Horz.Diam. Static Head	Horz.Diam. Vel. Heah	Vert.Diam. Static Head	Vert.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head
.017	7.10	2.45	6.05	1.70	6.60	1.90		
.067	7.27	3.60	7.10	3.50	7.00	3.15		
.117	7.75	4.35	7.65	4.60	7.25	4.40		
.167	7.90	4.70	7.90	4.95	7.45	4.50		
.217	7.80	4.50	8.10	5.10	7.50	4.60		
.267	7.80	4.95	8.30	5.30	7.50	4.45		
.317	7.95	4.90	8.00	5.30	7.50	4.40		
.367	8.05	5.00	8.60	5.50	7.50	4.50		
.417	8.05	5.00	8.50	5.10	7.65	4.70		
.467	8.15	4.96	9.20	5.20	7.57	4.40		
.517	8.50	5.00	8.20	5.05	7.70	4.45		
.567	8.40	4.80	8.20	4.50	7.80	4.30		
.617	8.60	4.30	8.35	4.10	7.95	3.60		

Temperature air in pipe 39.5 degrees cent.
" " " room 38.0 degrees cent.

POINT 4
Zero Reading .4

.017	9.00	1.80	8.50	1.40	9.10	1.60
.067	9.70	3.10	8.50	2.30	9.50	3.40
.110	10.30	4.40	8.80	3.20	10.00	4.30
.167	10.50	4.90	8.90	3.40	10.00	4.70
.217	10.80	5.60	9.00	3.80	10.00	4.90
.267	10.80	5.60	9.20	4.10	10.50	5.40
.317	11.00	5.90	9.60	4.50	10.50	5.50
.367	11.00	5.90	9.50	4.70	10.70	6.00.
.417	11.20	5.70	9.50	4.50	10.50	5.40
.467	11.10	5.60	9.70	4.40	10.50	5.10
.517	11.00	5.20	9.60	4.00	10.60	5.20
.567	11.00	4.80	9.70	3.70	10.60	4.70
.617	11.00	4.30	9.80	3.30	10.70	4.30

Temperature air in pipe 38.0 degrees cent.
" " " room 34.5 degrees cent.

NOW 6

[illegible]

[illegible]

Zero Position [illegible]

Diam. Front	Form. dam. Ratio Rad.	Ver. dia. Ratio Depth	Alter. dia. Ratio Depth	Inner Diam. Ratio Rad.	Width Ratio Rad.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Correspondence also in plus [illegible] Superior [illegible].
" " " [illegible] [illegible] [illegible].

[illegible]

Zero Position [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Correspondence also in plus [illegible] Superior [illegible].
" " " [illegible] [illegible] [illegible].

RUN B

FIELD DATA

POINT 5

Zero Reading .9

Diam. Feet	Horz.Diam. Static Head	Horz.Diam. Vel. Head	Vert.Diam. Static Head	Vert.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head
.017			11.70	2.65	12.07	2.45	11.80	1.95
.067			12.25	3.70	12.20	3.55	12.20	3.60
.117			12.10	4.10	12.70	4.35	12.70	4.15
.167			12.10	4.10	12.90	5.00	12.65	4.75
.217			12.00	4.300	12.85	5.10	12.85	5.05
.267			11.52	3.80	13.00	5.10	13.25	5.20
.317			13.95	5.25	13.65	5.90	13.55	5.95
.367			13.30	5.75	13.65	5.75	13.20	5.90
.417			13.60	5.85	14.00	6.00	13.40	6.05
.467			13.40	5.45	14.10	5.85	13.50	5.63
.517			13.35	5.05	14.15	5.85	13.75	5.50
.567			13.55	5.15	13.95	5.40	13.60	5.15
.617			13.60	4.55	13.95	4.90	13.70	4.55

Temperature air in pipe 37.0 degrees cent.
" " " room 29.0 degrees cent.

POINT 6

Zero Reading .0

.017	12.10	1.90	12.90	2.45	12.10	1.75	12.90	2.10
.067	11.90	2.60	13.10	3.45	12.95	3.00	12.70	2.50
.117	12.15	2.70	13.20	3.85	13.10	3.65	13.00	3.20
.167	12.30	3.00	13.70	4.05	13.30	3.88	13.05	3.40
.217	12.60	3.00	13.70	4.35	13.45	4.15	13.10	3.50
.267	12.45	3.20	13.60	4.35	13.50	3.75	13.25	3.60
.317	12.50	2.80	13.50	4.45	13.40	4.00	13.25	3.60
.367	12.55	3.10	13.50	4.45	13.55	3.90	13.20	3.65
.417	12.90	3.20	13.50	4.05	13.45	4.00	13.10	3.70
.467	12.95	3.40	13.55	4.50	13.55	4.15	13.10	3.75
.517	12.90	3.50	13.50	4.25	13.10	4.10	13.05	3.80
.567	13.05	3.50	13.50	4.35	13.10	4.10	13.05	3.75
.617	13.40	3.30	13.60	4.00	13.20	4.00	13.15	3.30

Temperature air in pipe 39.50 degrees cent.
" " " room 34.00 degrees cent.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

RUN B

FIELD DATA

POINT 7

Zero Reading .25

Diam. Feet	Horz.Diam. Static Head	Horz.Diam. Vel. Head	Vert.Diam. Static Head	Vert.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head
.017	14.75	1.95	14.50	1.60	14.85	2.15	14.20	1.55
.067	14.75	2.75	14.90	2.90	15.10	3.15	14.20	2.45
.117	14.95	3.50	15.15	3.95	15.40	3.95	14.35	2.90
.167	15.00	3.95	15.35	4.35	15.60	4.55	14.90	3.70
.217	15.10	4.45	15.55	4.65	15.70	4.80	14.95	4.05
.267	14.90	4.50	15.50	4.75	15.80	5.00	15.05	4.20
.317	16.10	5.40	15.35	4.85	15.95	5.20	15.10	4.20
.367	15.40	5.30	15.30	4.80	15.80	5.10	15.05	4.15
.417	15.30	4.85	15.40	4.75	15.80	5.00	15.05	4.10
.467	15.55	4.70	15.25	4.55	15.85	4.70	15.15	4.10
.517	15.60	4.55	15.30	4.30	15.90	4.55	15.25	4.10
.567	15.60	4.25	15.40	4.00	16.05	4.30	15.35	3.75
.617	15.65	3.65	15.30	3.20	15.80	3.50	15.55	3.15

Temperature air in pipe 42.0 degrees cent.
" " " room 35.4 degrees cent.

POINT 8

Zero Reading .3

.017	17.40	1.90	18.10	2.50	18.00	2.20	17.00	1.45
.067	18.05	3.50	18.72	4.20	19.07	4.50	17.75	2.85
.117	18.20	4.23	19.35	5.25	19.50	5.40	18.15	4.20
.167	18.55	4.72	19.65	6.00	19.80	6.10	18.35	4.80
.217	18.72	5.35	19.83	6.50	20.10	6.80	18.60	5.00
.267	18.60	5.50	20.12	7.12	20.15	7.10	18.55	5.28
.317	18.80	5.72	20.32	7.45	20.35	7.32	18.50	5.50
.367	18.80	5.72	20.50	7.60	20.40	7.32	18.70	5.50
.417	18.70	5.36	20.65	7.40	20.45	7.10	18.70	5.35
.467	18.70	5.12	20.45	7.00	20.10	6.80	18.70	4.93
.517	18.95	4.95	20.25	6.40	20.20	6.18	18.80	4.75
.567	18.85	4.25	20.15	5.80	20.20	5.60	18.80	4.28
.617	18.90	3.70	20.10	5.00	19.85	4.75	18.90	3.60

Temperature air in pipe 38.00 degrees cent.
" " " room 37.50 degrees cent.

RUN C

FIELD DATA

POINT 5
Zero Reading .9

Diam. Feet	Horz.Diam. Static Head	Horz.Diam. Vel. Head	Vert.Diam. Static Head	Vert.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head
.017			9.40	3.20	9.45	3.10	8.85	2.20
.067			9.50	4.10	9.30	4.00	9.50	3.80
.117			10.00	5.00	9.50	4.60	9.95	4.65
.167			10.15	5.20	10.00	5.25	10.35	5.25
.217			10.40	6.00	10.40	5.75	10.80	6.10
.267			10.60	6.30	10.65	5.95	11.40	6.85
.317			10.80	6.00	10.75	6.25	11.75	7.10
.367			11.00	5.95	10.60	5.85	11.80	7.20
.417			10.80	6.25	10.70	5.70	11.40	7.10
.467			10.70	5.90	10.85	6.00	11.35	6.75
.517			10.65	5.80	10.90	5.70	11.30	6.30
.567			10.70	5.45	10.90	5.40	11.10	6.00
.617			10.80	5.00	10.10	5.05	11.35	5.45

Temperature air in pipe 36 degrees cent.
" " " room229 degrees cent.

POINT 6
Zero Reading .0

.017	9.90	2.40	10.30	2.50	10.30	2.70	9.90	1.90
.067	10.50	3.30	10.30	3.20	10.50	3.60	9.80	2.80
.117	10.50	3.50	10.70	4.00	10.80	4.00	9.90	3.20
.167	10.50	3.80	10.90	4.30	10.80	4.30	10.20	3.30
.217	10.60	4.20	11.00	4.40	11.00	4.40	10.20	3.60
.267	10.60	4.00	11.00	4.50	11.00	4.40	10.10	3.70
.317	10.60	4.00	11.00	4.50	11.10	4.50	10.30	3.80
.367	10.70	4.00	11.00	4.50	11.00	4.60	10.30	3.90
.417	10.60	4.30	10.90	4.50	11.10	4.60	10.20	3.80
.467	10.50	4.10	10.80	4.40	11.00	4.60	10.10	3.70
.517	10.60	4.10	10.50	4.40	10.70	4.70	10.30	3.90
.567	10.80	4.10	10.80	4.30	10.80	4.80	10.30	3.90
.617	10.90	3.80	11.00	4.10	11.10	4.40	10.40	3.40

Temperature air in pipe 36.5 degrees cent.
" " " room 34.0 degrees cent.

RUN C

FIELD DATA

POINT Ø

Zero Reading .5

Diam. Feet	Horz.Diam. Static Head	Horz.Diam. Vel. Head	Vert.Diam. Static Head	Vert.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head
.017	11.72	1.80	11.45	1.80	12.30	2.25	11.50	1.80
.067	11.92	2.10	11.60	2.75	12.48	3.28	11.48	2.05
.117	12.30	3.92	12.05	3.95	12.85	4.02	11.45	3.30
.167	12.67	4.60	12.35	4.35	13.00	4.80	12.08	4.05
.217	12.80	4.85	12.48	4.75	13.15	5.08	12.30	4.25
.267	12.85	4.92	12.65	4.85	13.25	5.00	12.50	4.65
.317	12.92	5.20	12.65	4.98	13.30	5.30	12.50	4.60
.367	12.80	5.00	12.48	4.80	13.18	5.20	12.60	4.72
.417	12.85	4.88	12 55	4.75	13.25	5.28	12.55	4.55
.467	12.75	4.75	12.65	4.65	13.30	5.00	12.58	4.50
.517	12.80	4.65	12.60	4.50	13.25	4.80	12.65	4.45
.567	12.88	4.05	12.70	4.25	13.28	4.40	12.75	4.10
.617	12.45	3.12	12.95	3.55	13.30	3.70	12.70	3.25

Temperature air in room 35 degrees cent.
" " " pipe 35 degrees cent.

POINT 8

Zero Reading .3

.017	14.96	1.70	16.00	2.40	14.70	1.80	15.75	2.35
.067	15.75	3.30	16.60	4.40	15.45	3.20	16.70	4.75
.117	15.80	4.30	17.00	5.60	15.90	4.35	17.05	5.40
.167	16.00	5.00	17.30	6.45	16.20	5.15	17.30	6.22
.217	16.10	5.32	17.55	6.85	16.20	5.60	17.60	6.85
.267	16.20	5.80	18.20	6.85	16.20	5.68	17.95	7.30
.317	16.25	5.96	18.25	7.75	16.15	5.60	17.95	7.55
.367	16.16	5.80	18.40	8.00	16.00	5.56	18.00	7.52
.417	16.45	5.90	18.60	7.85	16.35	5.80	18.00	7.38
.467	16.32	5.45	18.45	7.75	16.30	5.35	17.90	7.20
.517	16.10	5.00	18.35	7.10	16.35	5.05	17.60	6.15
.567	16.25	4.40	17.85	6.32	16.48	4.60	17.70	5.80
.617	16.50	3.75	17.51	5.15	16.45	3.90	17.65	5.00

Temperature air in pipe 38.5 degrees cent.
" " " room 38.5 degrees cent.

RUN D

FIELD DATA

POINT 1

Zero Reading .6

Diam. Feet	Horz.Diam. Static Head	Horz.Diam. Vel. Head	Vert.Diam. Static Head	Vert.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head
.017	7.90	2.40	8.30	2.70	8.10	2.10		
.067	8.40	3.90	9.10	4.20	8.80	3.60		
.117	8.70	4.20	9.30	4.80	8.90	4.20		
.167	8.80	4.70	9.40	5.10	9.00	4.60		
.217	8.90	5.10	9.50	5.50	9.00	5.00		
.267	8.50	4.60	9.60	5.70	9.00	5.10		
.317	8.40	4.90	9.50	5.90	9.00	5.50		
.367	9.00	5.25	9.60	6.30	9.00	5.80		
.417	9.40	6.00	9.75	6.50	9.00	6.00		
.467	9.50	6.10	9.80	6.70	9.10	6.20		
.517	9.50	5.90	10.20	7.10	9.40	6.70		
.567	9.60	5.70	10.20	6.70	9.60	6.00		
.617	9.50	5.20	10.30	6.00	9.60	5.00		

Temperature air in pipe 29.5 degrees cent.
" " " room 28.0 degrees cent.

POINT 2

Zero Reading .75

.017	9.65	2.30	9.15	3.10	9.60	2.45
.067	10.15	4.25	10.00	4.00	10.10	4.00
.117	10.50	5.15	10.20	4.70	10.22	4.90
.167	10.50	5.60	10.60	5.00	10.55	5.26
.217	10.90	6.00	10.60	5.40	10.75	5.85
.267	10.90	5.90	10.65	5.70	10.65	5.96
.317	10.85	5.70	10.75	5.75	10.55	5.75
.367	11.20	6.05	10.75	5.70	10.50	5.55
.417	10.85	5.30	10.90	5.90	10.60	5.35
.467	10.80	5.50	11.05	5.90	10.60	5.25
.517	11.00	5.35	11.16	5.55	10.65	4.90
.567	11.05	5.00	11.10	5.25	10.80	4.68
.617	11.00	4.40	11.05	4.35	10.90	4.30

Temperature air in pipe 30.0 degrees cent.
" " " room 31.0 degrees cent.

RUN D

FIELD DATA

POINT 3
Zero Reading .75

Diam. Feet	Horz.Diam. Static Head	Horz.Diam. Vel. Head	Vert.Diam. Static Head	Vert.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head
.017	10.80	2.00	11.80	1.90	11.40	2.40		
.067	11.80	4.00	12.80	4.50	11.60	3.90		
.117	12.30	5.10	13.20	5.10	11.90	4.70		
.167	12.30	5.20	13.70	6.10	12.10	5.20		
.217	12.40	5.60	14.00	6.40	12.30	5.60		
.267	12.60	6.00	14.30	7.20	12.40	6.00		
.317	13.00	6.70	14.50	7.20	12.60	6.30		
.367	13.10	6.60	14.70	7.70	12.80	6.35		
.417	13.10	6.50	14.50	7.30	12.10	6.10		
.467	13.10	6.40	14.50	7.10	12.00	6.20		
.517	12.90	5.80	14.30	6.50	12.10	5.00		
.567	13.00	5.20	14.30	6.00	11.90	4.50		
.617	13.00	4.60	14.00	5.00	12.00	3.80		

Temperature air in pipe 29.50 degrees cent.
" " " room 31.50 degrees cent.

POINT 4
Zero Reading .7

.017	14.20	2.65	13.95	2.15	14.20	2.40		
.067	14.85	4.30	14.10	3.15	14.80	4.15		
.117	15.20	5.05	14.10	3.95	15.00	4.90		
.167	15.42	5.65	14.95	4.20	15.20	5.40		
.217	15.30	6.00	15.25	6.05	15.30	5.80		
.267	15.28	6.40	15.50	6.65	15.45	6.40		
.317	15.95	6.65	15.60	6.65	15.58	6.65		
.367	15.95	6.65	15.65	6.65	15.62	6.60		
.417	15.90	6.50	15.70	6.50	15.75	6.30		
.467	16.05	6.05	15.75	6.15	15.60	6.20		
.517	15.85	5.75	15.75	5.90	15.62	5.50		
.567	15.72	5.10	15.95	5.50	15.78	5.25		
.617	15.85	4.40	15.95	4.95	15.75	4.62		

Temperature air in pipe 29.50 degrees cent.
"" " " room 33.00 degrees cent.

RUN D

FIELD DATA

POINT 5

Zero Reading..7

Diam. Feet	Horz.Diam. Static Head	Horz.Diam. Vel. Head	Vert.Diam. Static Head	Vert.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head
.017	17.28		17.28	2.95	15.70	1.65	16.05	1.60
.067			17.00	3.90	16.00	2.85	16.55	3.40
.117			17.12	4.70	16.35	3.50	17.10	4.55
.167			17.75	5.22	17.15	4.20	17.75	5.30
.217			17.70	5.75	17.37	5.45	17.45	5.80
.267			18.22	6.45	17.70	5.40	17.65	5.90
.317			18.12	6.30	17.50	5.65	18.10	6.45
.367			18.15	6.60	18.00	6.00	18.17	6.55
.417			18.22	6.40	18.15	6.25"	18.20	6.40
.467			18.05	6.20	18.00	5.75	18.30	6.55
.517			18.15	5.85	17.75	5.50	18.50	5.90
.567			18.10	5.42	17.80	4.65	18.15	5.35
.617			18.05	4.95	17.95	4.50	18.10	4.65

Temperature air in pipe 29.0 degrees cent.
" " " room 23.5 degrees cent.

POINT 6

Zero Reading .2

.017	16.90	2.30	17.50	2.50	17.30	2.60	18.10	2.60
.067	17.60	3.70	18.40	3.60	18.40	3.60	18.70	3.60
.117	18.10	4.30	18.60	4.40	18.90	4.80	18.90	4.40
.167	18.60	4.40	18.70	4.60	19.10	4.80	19.00	4.60
.217	18.60	4.50	19.00	4.70	19.00	4.90	19.00	4.80
.267	18.50	4.40	19.20	5.00	18.90	4.80	19.00	4.90
.317	18.50	4.00	19.20	4.90	18.70	4.70	19.00	4.90
.367	18.10	3.70	19.30	5.20	18.80	4.70	19.10	4.90
.417	18.00	3.80	19.20	5.00	18.90	4.90	18.90	4.80
.467	18.40	4.20	19.10	4.90	18.80	4.90	18.60	4.70
.517	18.30	4.10	19.00	5.00	19.10	5.00	18.60	4.70
.567	18.60	4.20	18.90	4.90	18.90	5.30	18.60	4.80
.617	18.80	3.80	18.90	4.50	19.30	4.80	18.50	4.20

Temperature air in pipe 40.0 degrees cent.
" " " room 36.0 degrees cent.

RUN D

FIELD DATA

POINT 7
Zero Reading .5

Diam. Feet	Horz.Diam. Static Head	Horz.Diam. Vel. Head	Vert.Diam. Static Head	Vert.Diam. Vel. Head	45degrDiam. Static Head	45degrDiam. Vel. Head	45deg.Diam. Static Head	45deg.Diam. Vel. Head
.017	19.65	2.30	19.40	2.10	20.60	2.50	19.45	2.15
.067	20.00	3.15	19.42	3.40	20.80	3.50	19.70	2.88
.117	20.20	3.55	20.00	4.10	21.10	4.60	19.80	3.80
.167	20.20	4.45	20.20	4.60	21.35	5.00	20.18	4.68
.217	20.30	4.55	20.25	4.83	21.40	5.35	20.55	4.90
.267	20.50	4.90	20.45	5.00	21.60	5.85	20.70	5.18
.317	20.85	5.35	20.40	5.15	21.65	5.82	20.50	5.35
.367	20.40	4.80	20.25	5.05	21.60	5.70	20.50	5.30
.417	20.45	4.65	20.35	5.10	21.50	5.55	20.40	5.05
.467	20.45	4.55	20.40	5.10	21.50	5.45	20.60	5.10
.517	20.35	4.50	20.45	4.90	21.50	5.10	20.50	4.90
.567	20.40	3.90	20.55	4.35	21.45	4.65	20.55	4.40
.617	20.80	3.20	21.00	3.70	21.50	3.95	20.70	3.98

Temperature air in pipe 38.0 degrees cent.
" " " room 33.75 degrees cent.

POINT 8
Zero Reading .3

.017	23.52	2.00	24.25	2.30	23.20	1.70	24.60	2.45
.067	24.50	3.90	25.85	4.80	24.05	3.60	25.90	5.00
.117	24.55	4.63	26.25	5.95	24.30	4.48	26.30	6.25
.167	24.55	5.35	26.60	6.90	24.60	5.05	26.60	7.25
.217	24.55	5.55	27.00	7.70	24.60	5.40	26.75	8.00
.267	24.65	5.93	26.90	8.60	24.72	6.00	27.10	8.50
.317	24.65	6.18	27.60	8.70	24.80	6.12	27.10	8.50
.367	24.65	5.95	27.40	9.00	24.85	5.98	27.20	8.60
.417	24.65	5.92	27.35	8.45	24.70	5.85	26.85	8.40
.467	24.75	5.26	27.25	7.80	24.70	5.35	26.90	7.40
.517	24.80	5.13	27.30	7.55	24.60	4.80	26.60	7.05
.567	24.80	4.70	26.80	6.56	24.80	4.50	26.60	6.35
.617	24.98	4.18	26.60	5.45	24.85	3.96	26.55	5.50

Temperature air in pipe 38.0 degrees cent.
" " " room 37.0 degrees cent.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Correction factor for air velocity in 8" conveyor pipe necessitated because of pitot tube obstruction to flow of air.

Dist. Feet Pitot Tube projects across pipe	Longitudinal area tube in pipe (sq.in.) (t)	Reduced area pipe (sq.in.) (R)= P-t	Velocity air varies inversely as area. Velocity Corr. Fact.= $\frac{R}{P}$
Cross section area pipe = 45.664 sq.in. = P.			
.0000	.0000	45.6640	1.000
.0635	.1905	45.4735	.994
.1270	.3810	45.2830	.991
.1905	.5720	45.0920	.986
.2540	.7630	44.9010	.983
.3175	.9540	44.7100	.979
.3810	1.1430	44.5210	.975
.4445	1.3330	44.3310	.970
.5080	1.5240	44.1400	.965
.5715	1.7140	43.9500	.961
.6350	1.9050	43.7590	.957

RUN A

DERIVED DATA

VERTICAL DIAMETER-POINT 1-TEMP.PIPE 302.5 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. $.823\ h_p$
.0000	6.40	.70	279.10	66.2	1.000	66.2	.31669	5.26
.0635	6.90	2.95	278.60	136.0	.994	135.2	.20268	5.68
.1270	7.30	3.75	278.20	155.5	.991	152.0	.11400	6.01
.1905	7.60	4.28	277.90	164.0	.986	161.7	.05067	6.25
.2540	7.80	4.73	277.70	172.5	.983	169.5	.01267	6.42
.3175	7.90	5.10	277.60	179.2	.979	175.3	.00000	6.50
.3810	7.97	5.45	277.53	185.4	.975	180.7	.01267	6.56
.4445	8.03	5.70	277.47	189.5	.970	183.7	.05067	6.61
.5080	8.10	5.78	277.40	190.7	.965	184.0	.11400	6.66
.5715	8.17	5.48	277.33	186.0	.961	178.8	.20268	6.72
.6350	8.27	4.15	277.23	162.0	.957	155.0	.31669	6.80

HORIZONTAL DIAMETER-POINT 1-TEMP.PIPE 302.5 C Abs.

.0000	6.45	1.26	279.05	88.8	1.000	88.8	.31669	5.31
.0635	6.83	3.00	278.67	137.0	.994	136.0	.20268	5.63
.1270	7.05	3.76	278.45	153.5	.991	152.0	.11400	5.80
.1905	7.17	4.07	278.33	160.0	.986	157.7	.05067	5.90
.2540	7.25	4.16	278.25	161.5	.983	158.7	.01267	5.97
.3175	7.21	4.30	278.29	164.3	.979	161.0	.00000	5.93
.3810	7.01	4.77	278.49	173.0	.975	168.6	.01267	5.77
.4445	7.10	5.06	278.40	178.2	.970	172.8	.05067	5.85
.5080	7.45	4.96	278.05	176.6	.965	170.0	.11400	6.13
.5715	7.63	4.50	277.87	168.4	.961	162.0	.20268	6.28
.6350	7.75	3.52	277.75	148.8	.957	142.3	.31669	6.38

45 DEGREE DIAMETER-POINT 1-TEMP.PIPE 302.5 C Abs.

.0000	6.45	1.66	279.05	102.0	1.000	102.0	.31669	5.31
.0635	6.95	2.87	278.55	134.2	.994	133.3	.20268	5.72
.1270	7.33	3.55	278.17	149.2	.991	147.9	.11400	6.03
.1905	7.49	4.07	278.01	160.0	.986	157.7	.05067	6.16
.2540	7.50	4.55	278.00	169.2	.983	166.2	.01267	6.17
.3175	7.55	4.96	277.95	176.5	.979	172.7	.00000	6.21
.3810	7.62	5.35	277.88	183.5	.975	178.9	.01267	6.27
.4445	7.70	5.67	277.80	189.0	.970	183.3	.05067	6.34
.5080	7.81	5.65	277.69	188.5	.965	181.8	.11400	6.42
.5715	7.90	5.25	277.60	182.0	.961	175.0	.20268	6.50
.6350	7.78	4.50	277.72	168.2	.957	161.0	.31669	6.40

RUN A

DERIVED DATA

HORIZONTAL DIAMETER-POINT 2-TEMP.PIPE 303.0 C Abs.

Diam. Feet	h_p	h_v	285.5-h_p	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	7.38	1.15	278.12	85.0	1.000	85.0	.31669	6.07
.0635	7.48	2.37	278.02	122.2	.994	121.3	.20268	6.15
.1270	7.60	3.17	277.90	141.4	.991	140.0	.11400	6.25
.1905	7.76	3.65	277.74	151.8	.986	149.6	.05067	6.39
.2640	8.02	3.95	277.48	158.0	.983	155.2	.01267	6.60
.3175	8.40	4.18	277.10	162.6	.979	159.1	.00000	6.92
.3810	8.68	4.30	276.83	165.0	.975	160.8	.01267	7.13
.4445	8.78	4.22	276.72	163.1	.970	158.2	.05067	7.22
.5080	8.85	3.95	276.65	158.0	.965	152.4	.11400	7.28
.5715	8.88	3.46	276.62	148.0	.961	142.2	.20268	7.31
.6350	8.89	2.80	276.61	133.0	.957	127.2	.31669	7.32

VERTICAL DIAMETER-POINT 2-TEMP.PIPE 303.0 C Abs.

.0000	7.55	1.50	277.95	97.3	1.000	97.3	.31669	6.22
.0635	8.10	3.10	277.40	140.0	.994	139.0	.20268	6.67
.1270	8.53	4.05	276.97	160.0	.991	158.5	.11400	7.02
.1905	8.75	4.50	276.75	169.0	.986	166.6	.05067	7.20
.2540	8.87	4.77	276.63	173.3	.983	170.0	.01267	7.30
.3175	8.95	4.97	276.55	177.3	.979	173.3	.00000	7.36
.3810	8.99	5.07	276.51	179.0	.975	174.3	.01267	7.40
.4445	9.02	5.00	276.48	178.0	.970	172.6	.05067	7.43
.5080	9.04	4.77	276.46	173.7	.965	167.4	.11400	7.44
.5715	9.05	4.20	276.45	163.0	.961	156.7	.20268	7.45
.6350	9.06	3.35	276.44	145.7	.957	139.3	.31669	7.46

45 DEGREE DIAMETER-POINT 2-TEMP.PIPE 303.0 C Abs.

.0000	7.57	.80	277.93	71.0	1.000	71.0	.31669	6.23
.0635	8.06	2.85	277.44	134.0	.994	133.0	.20268	6.63
.1270	8.38	3.20	271.12	142.3	.991	141.0	.11400	6.90
.1905	8.54	4.15	276.96	162.0	.986	159.7	.05067	7.03
.2540	8.66	4.45	276.84	168.0	.983	165.0	.01267	7.13
.3175	8.75	4.60	276.75	171.0	.979	167.3	.00000	7.20
.3810	8.80	4.58	276.70	170.0	.975	165.7	.01267	7.25
.4445	8.82	4.40	276.80	167.0	.970	162.0	.05067	7.26
.5080	8.80	4.07	276.70	160.5	.965	154.8	.11400	7.25
.5715	8.75	3.62	276.75	151.3	.961	145.4	.20268	7.20
.6350	8.67	3.00	276.83	137.3	.957	131.3	.31669	7.14

RUN A

DERIVED DATA

HORIZONTAL DIAMETER-POINT 3-TEMP.PIPE 302.5 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr, Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	9.75	1.80	275.75	107.0	1.000	107.0	.31669	8.02
.0635	11.60	4.10	273.90	162.0	.994	161.0	.20268	9.55
.1270	12.15	5.40	273.35	186.0	.991	184.2	.11400	10.00
.1905	12.35	6.10	273.15	198.0	.986	195.0	.05067	10.17
.2540	12.48	6.47	273.02	203.5	.983	199.8	.01267	10.27
.3175	12.57	6.70	272.93	207.2	.979	202.4	.00000	10.33
.3810	12.67	6.70	272.83	207.3	.975	202.0	.01267	10.42
.4445	12.72	6.52	272.78	204.5	.970	198.0	.05067	10.47
.5080	12.74	6.10	272.76	197.7	.965	190.5	.11400	10.48
.5715	12.68	5.45	272.82	187.0	.961	179.6	.20268	10.45
.6350	12.52	4.72	272.98	174.0	.957	166.5	.31669	10.31

VERTICAL DIAMETER-POINT 3-TEMP.PIPE 302.5 C Abs.

.0000	9.80	1.60	275.70	101.0	1.000	101.0	.31669	8.06
.0635	11.60	4.20	273.90	164.0	.994	163.0	.20268	9.55
.1270	12.37	5.60	273.13	189.5	.991	187.7	.11400	10.18
.1905	12.73	6.40	272.77	202.7	.986	200.0	.05067	10.48
.2540	12.95	7.07	272.55	213.0	.983	208.2	.01267	10.66
.3175	13.05	7.42	272.45	218.0	.979	213.2	.00000	10.73
.3810	13.05	7.44	272.45	218.5	.975	213.0	.01267	10.73
.4445	12.93	7.00	272.57	212.0	.970	205.5	.05067	10.64
.5080	12.58	6.15	272.92	198.5	.965	191.3	.11400	10.35
.5715	11.97	4.33	273.53	166.5	.961	160.0	.20268	9.85
.6350	11.12	1.20	274.38	87.5	.957	79.3	.31669	9.15

45 DEGREE DIAMETER-POINT 3-TEMP.PIPE 302.5 C Abs.

.0000	9.86	1.40	275.64	94.3	1.000	94.3	.31669	8.12
.0635	10.75	3.60	274.75	151.5	.994	150.6	.20268	8.85
.1270	11.26	4.80	274.24	175.0	.991	173.3	.11400	9.25
.1905	11.58	5.54	273.92	188.0	.986	185.3	.05067	9.53
.2540	11.85	5.92	273.65	194.5	.983	190.5	.01267	9.75
.3175	12.05	6.12	273.45	198.0	.979	193.8	.00000	9.90
.3810	12.20	6.15	273.30	198.5	.975	193.5	.01267	10.05
.4445	12.30	6.05	273.20	197.0	.970	191.0	.05067	10.12
.5080	12.30	5.72	273.20	191.5	.965	184.6	.11400	10.12
.5715	12.15	5.20	273.35	182.6	.961	175.3	.20268	10.00
.6350	11.90	4.47	273.60	169.0	.957	161.8	.31669	9.80

RUN A

DERIVED DATA

HORIZONTAL DIAMETER-POINT 4-TEMP.PIPE 310.5 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	10.82	1.23	274.68	89.5	1.000	89.5	.31669	8.90
.0635	11.01	2.44	274.49	126.3	.994	125.7	.20268	9.06
.1270	11.21	3.30	274.29	147.0	.991	145.7	.11400	9.23
.1905	11.42	3.85	274.08	158.7	.986	156.3	.05067	9.40
.2540	11.61	4.30	273.89	168.0	.983	165.0	.01267	9.56
.3175	11.80	4.65	273.70	174.5	.979	170.8	.00000	9.72
.3810	11.95	4.83	273.55	178.0	.975	173.6	.01267	9.83
.4445	12.08	4.70	272.42	176.0	.970	170.5	.05067	9.95
.5080	12.15	4.50	272.35	168.3	.965	162.3	.11400	10.00
.5715	12.20	3.83	272.30	158.8	.961	152.5	.20268	10.04
.6350	12.20	3.30	272.30	147.4	.957	141.0	.31669	10.04

VERTICAL DIAMETER-POINT 4-TEMP.PIPE 310.5 C Abs.

.0000	10.40	.70	275.10	67.5	1.000	67.5	.31669	8.56
.0635	11.00	2.40	274.50	125.3	.994	124.7	.20268	9.05
.1270	11.33	3.55	274.17	152.5	.991	151.0	.11400	9.32
.1905	11.53	4.15	273.97	168.0	.986	165.6	.05067	9.48
.2540	11.68	4.50	273.82	171.8	.983	168.8	.01267	9.60
.3175	11.79	4.70	273.71	175.7	.979	171.8	.00000	9.70
.3810	11.86	4.73	273.64	176.2	.975	171.8	.01267	9.75
.4445	11.92	4.60	273.58	173.8	.970	168.3	.05067	9.80
.5080	11.95	4.25	273.55	167.0	.965	161.0	.11400	9.83
.5715	11.95	3.78	273.55	157.5	.961	151.3	.20268	9.83
.6350	11.92	3.17	273.58	144.1	.957	138.0	.31669	9.81

45 DEGREE DIAMETER-POINT 4-TEMP.PIPE 310.5 C Abs.

.0000	11.06	1.33	274.44	93.2	1.000	93.2	.31669	9.10
.0635	11.36	2.44	274.14	138.6	.994	137.7	.20268	9.35
.1270	11.65	3.82	273.85	158.2	.991	156.7	.11400	9.59
.1905	11.90	4.43	273.60	170.4	.986	168.0	.05067	9.80
.2540	12.15	4.90	273.35	179.2	.983	176.0	.01267	10.00
.3175	12.35	5.30	273.15	186.5	.979	182.5	.00000	10.18
.3810	12.45	5.38	273.05	188.0	.975	183.3	.01267	10.25
.4445	12.45	5.10	273.05	183.0	.970	177.4	.05067	10.25
.5080	12.40	4.64	273.10	174.5	.965	168.2	.11400	10.21
.5715	12.32	4.12	273.18	164.5	.961	158.0	.20268	10.14
.6350	12.25	3.50	273.25	151.6	.957	145.0	.31669	10.09

RUN A

DERIVED DATA

VERTICAL DIAMETER-POINT 5-TEMP.PIPE 311.0 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. $.823\ h_p$
.0000	12.70	1.17	272.80	87.9	1.000	87.9	.31669	10.46
.0635	13.00	2.20	272.50	120.7	.994	120.0	.20268	10.70
.1270	13.30	3.15	272.20	144.6	.991	143.2	.11400	10.95
.1905	13.55	4.00	271.95	163.1	.986	160.8	.05067	11.16
.2540	13.74	4.50	271.76	173.0	.983	170.0	.01267	11.31
.3175	13.92	4.75	271.58	177.7	.979	174.0	.00000	11.47
.3810	14.07	4.80	271.43	178.7	.975	174.0	.01267	11.58
.4445	14.12	4.71	271.38	177.7	.970	171.6	.05067	11.62
.5080	14.10	4.40	271.40	170.9	.965	164.8	.11400	11.60
.5715	14.03	3.97	271.47	162.5	.961	156.0	.20268	11.55
.6350	13.90	3.47	271.60	151.9	.957	145.2	.31669	11.45

45 DEGREE DIAMETER-POINT 5-TEMP.PIPE 311.0 C Abs.

.0000	12.63	.70	272.87	68.0	1.000	68.0	.31669	10.40
.0635	13.03	2.60	272.47	131.3	.994	130.6	.20268	10.72
.1270	13.38	3.72	272.12	157.0	.991	155.5	.11400	11.01
.1905	13.69	4.32	271.81	169.3	.986	167.0	.05067	11.27
.2540	13.96	4.70	271.54	177.0	.983	174.0	.01267	11.50
.3175	14.20	4.98	271.30	182.0	.979	178.2	.00000	11.70
.3810	14.37	5.10	271.13	184.2	.975	179.6	.01267	11.82
.4445	14.48	5.00	271.02	182.5	.970	177.0	.05067	11.91
.5080	14.50	4.68	271.00	176.5	.965	170.3	.11400	11.93
.5715	14.43	4.13	271.07	165.6	.961	159.0	.20268	11.89
.6350	14.30	3.50	271.20	152.7	.957	146.0	.31669	11.78

45 DEGREE DIAMETER-POINT 5-TEMP.PIPE 311.0 C Abs.

.0000	12.52	1.20	272.98	89.0	1.000	89.0	.31669	10.30
.0635	13.65	2.50	272.45	129.0	.994	128.2	.20268	10.74
.1270	13.50	3.53	271.99	153.0	.991	151.5	.11400	11.13
.1905	13.82	4.23	271.68	168.0	.986	165.5	.05067	11.38
.2540	14.00	4.69	271.50	177.0	.983	174.0	.01267	11.52
.3175	14.08	4.91	271.42	180.5	.979	176.9	.00000	11.60
.3810	14.13	4.90	271.37	180.5	.975	176.0	.01267	11.62
.4445	14.17	4.80	271.33	179.0	.970	173.5	.05067	11.68
.5080	14.19	4.46	271.31	172.3	.965	166.2	.11400	11.69
.5715	14.20	4.00	271.30	163.2	.961	156.8	.20268	11.70
.6350	14.20	4.54	271.30	174.0	.957	166.4	.31669	11.70

RUN A

DERIVED DATA

HORIZONTAL DIAMETER-POINT 6-TEMP.PIPE 312.5 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	12.92	1.10	272.58	81.3	1.000	81.3	.31669	10.64
.0635	13.25	1.53	272.25	100.7	.994	100.0	.20267	10.97
.1270	13.55	2.02	271.95	116.0	.991	115.0	.11400	11.15
.1905	13.80	2.30	271.70	123.8	.986	122.0	.05067	11.36
.2540	13.91	2.40	271.59	126.4	.983	124.2	.01267	11.46
.3175	13.89	2.27	271.61	123.0	.979	120.5	.00000	11.42
.3810	13.84	2.09	271.66	118.0	.975	115.0	.01267	11.40
.4445	13.92	2.11	271.58	118.5	.970	115.0	.05067	11.46
.5080	14.04	2.22	271.46	121.5	.965	117.2	.11400	11.56
.5715	14.13	2.25	271.37	122.3	.961	117.5	.20267	11.63
.6350	14.20	2.06	271.30	117.0	.957	112.0	.31669	11.69

VERTICAL DIAMETER-POINT 6-TEMP.PIPE 312.5 C Abs.

.0000	13.60	.50	271.90	57.6	1.000	57.6	.31669	11.20
.0635	14.13	1.40	271.37	112.5	.994	111.8	.20268	11.62
.1270	14.55	2.90	270.95	139.0	.991	137.7	.11400	11.98
.1905	14.81	3.38	270.69	150.0	.986	148.0	.05067	12.20
.2540	14.96	3.65	270.54	156.0	.983	153.2	.01267	12.30
.3175	15.07	3.82	270.43	159.7	.979	156.3	.00000	12.40
.3810	15.15	3.91	270.35	161.7	.975	157.5	.01267	12.47
.4445	15.17	3.90	270.33	161.3	.970	156.3	.05067	12.50
.5080	15.15	3.83	270.38	160.0	.965	154.3	1.11400	12.47
.5715	15.10	3.70	270.40	157.0	.961	150.8	.20268	12.43
.6350	15.05	3.55	270.45	154.0	.957	147.3	.31669	12.40

45 DEGREE DIAMETER-POINT 6-TEMP.PIPE 312.5 C Abs.

.0000	13.66	1.80	271.84	109.4	1.000	109.4	.31669	11.24
.0635	13.83	2.05	271.67	117.0	.994	116.2	.20268	11.38
.1270	14.00	2.33	271.50	124.5	.991	123.3	.11400	11.52
.1905	14.17	2.62	271.33	132.0	.986	130.0	.05067	11.65
.2540	14.35	2.89	271.15	138.7	.983	136.2	.01267	11.80
.3175	14.56	3.15	271.94	145.0	.979	142.0	.00000	11.98
.3810	14.68	3.40	270.82	150.5	.975	146.8	.01267	12.08
.4445	14.86	3.62	270.64	155.4	.970	150.7	.05067	12.22
.5080	15.04	3.78	270.46	159.0	.965	153.3	.11400	12.38
.5715	15.21	3.80	270.29	159.3	.961	153.0	.20268	12.51
.6350	15.38	3.67	270.12	156.5	.957	149.7	.31669	12.85

RUN A

DERIVED DATA

45 DEGREE DIAMETER-POINT 6-TEMP.PIPE 312.5 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr, Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	14.11	1.27	271.39	92.0	1.000	92.0	.31669	11.61
.0635	14.43	2.11	271.07	118.6	.994	118.0	.20268	11.88
.1270	14.69	2.86	270.81	138.0	.991	136.8	.11400	12.08
.1905	14.90	3.40	270.60	150.0	.986	148.3	.05067	12.26
.2540	15.00	3.70	270.50	157.0	.983	154.2	.01267	12.34
.3175	14.98	3.80	270.52	159.3	.979	156.0	.00000	12.32
.3810	14.92	3.78	270.58	159.0	.975	155.0	.01267	12.28
.4445	14.85	3.70	270.65	157.0	.970	152.2	.05067	12.21
.5080	14.76	3.52	270.74	153.0	.965	147.7	.11400	12.13
.5715	14.67	3.30	270.83	148.3	.961	142.3	.20268	12.07
.6350	14.57	3.05	270.93	142.5	.957	136.3	.31669	12.00

HORIZONTAL DIAMETER-POINT 7-TEMP.PIPE 315.25 C Abs.

.0000	15.10	.70	270.45	68.5	1.000	68.5	.31669	12.42
.0635	15.45	2.08	270.05	118.0	.994	117.0	.20268	12.70
.1270	15.77	3.12	269.73	144.7	.991	143.3	.11400	12.97
.1905	16.05	3.73	269.45	158.0	.986	156.0	.05067	13.20
.2540	16.25	4.07	269.25	165.0	.983	162.0	.01267	13.37
.3175	16.35	4.20	269.15	168.0	.979	164.5	.00000	13.46
.3810	16.40	4.15	269.10	167.0	.975	162.8	.01267	13.50
.4445	16.42	4.00	269.08	164.0	.970	159.0	.05067	13.51
.5080	16.45	3.75	269.05	158.8	.965	152.4	.11400	13.53
.5715	16.47	3.32	269.03	149.4	.961	143.2	.20268	13.55
.6350	16.50	2.80	269.00	137.0	.957	131.0	.31669	13.58

VERTICAL DIAMETER-POINT 7-TEMB.PIPE 313.25 C Abs.

.0000	15.37	.70	270.13	68.5	1.000	68.5	.31669	12.65
.0635	15.82	2.20	269.68	121.6	.994	120.4	.20268	13.01
.1270	16.17	3.30	269.33	149.0	.991	147.7	.11400	13.30
.1905	16.38	3.95	269.12	163.0	.986	160.7	.05067	13.48
.2540	16.48	4.23	269.02	168.5	.983	165.5	.01267	13.56
.3175	16.55	4.35	268.95	171.0	.979	167.3	.00000	13.60
.3810	16.58	4.37	268.92	171.3	.975	167.0	.01267	13.64
.4445	16.61	4.25	268.89	169.0	.970	163.8	.05067	13.68
.5080	16.65	4.00	268.85	164.0	.965	158.2	.11400	13.70
.5715	16.67	3.50	268.83	153.3	.961	147.3	.20268	13.70
.6350	16.70	2.85	268.80	138.4	.957	132.3	.31669	13.74

RUN A

DERIVED DATA

VERTICAL DIAMETER-POINT 8-TEMP.PIPE 311.5 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr, Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	19.15	.80	265.35	73.5	1.000	73.5	.31669	15.76
.0635	19.82	2.85	265.68	139.0	.994	137.7	.20268	16.30
.1270	20.30	3.95	265.20	164.0	.991	162.5	.11400	16.70
.1905	20.57	4.60	265.93	176.0	.986	173.5	.05067	16.90
.2540	20.72	5.20	264.78	188.0	.983	184.7	.01267	17.03
.3175	20.82	5.40	264.68	191.0	.979	187.0	.00000	17.12
.3810	20.87	5.50	264.63	193.0	.975	188.0	.01267	17.18
.4445	20.90	5.40	264.60	191.5	.970	185.6	.05067	17.20
.5080	20.92	4.90	264.58	182.5	.965	176.0	.11400	17.20
.5715	20.92	4.30	264.58	171.0	.961	164.3	.20268	17.20
.6350	20.92	3.60	264.58	156.3	.957	149.5	.31669	17.20

45 DEGREE DIAMETER-POINT 8-TEMP.PIPE 311.5 C Abs.

.0000	18.80	.80	266.70	73.5	1.000	73.5	.31669	15.47
.0635	19.85	2.60	265.65	133.0	.994	131.8	.20268	16.32
.1270	20.26	3.70	265.34	159.0	.991	157.5	.11400	16.68
.1905	20.41	4.30	265.09	171.0	.986	168.7	.05067	16.80
.2540	20.50	4.65	265.00	178.0	.983	175.0	.01267	16.86
.3175	20.53	4.75	265.47	179.0	.979	175.3	.00000	16.88
.3810	20.57	4.70	264.93	178.5	.975	174.0	.01267	16.90
.4445	20.60	4.45	264.90	174.0	.970	168.8	.05067	16.95
.5080	20.63	4.10	264.87	167.0	.965	161.0	.11400	16.97
.5715	20.65	3.55	264.85	155.0	.961	149.0	.20268	16.99
.6350	20.67	2.80	264.83	138.0	.957	132.0	.31669	17.00

45 DEGREE DIAMETER-POINT 8-TEMP.PIPE 311.5 C Abs.

.0000	19.50	1.20	266.00	90.1	1.000	90.1	.31669	16.04
.0635	20.17	3.10	265.33	145.0	.994	143.7	.20268	16.57
.1270	20.72	4.40	265.78	173.0	.991	171.3	.11400	17.03
.1905	21.10	5.27	264.40	189.3	.986	186.7	.05067	17.34
.2540	21.32	5.80	264.18	199.0	.983	195.5	.01267	17.52
.3175	21.40	6.10	264.10	204.0	.979	199.8	.00000	17.60
.3810	21.42	6.08	264.08	203.3	.975	198.0	.01267	17.62
.4445	21.39	5.70	264.11	197.0	.970	191.0	.05067	17.60
.5080	21.33	5.07	264.17	186.0	.965	179.3	.11400	17.54
.5715	21.20	4.35	264.30	172.0	.961	165.2	.20268	17.43
.6350	21.03	3.55	264.47	155.3	.957	148.6	.31669	17.30

RUN A

DERIVED DATA

45 DEGREE DIAMETER-POINT 7-TEMP.PIPE 313.25 C Abs.

Diam. Feet	h_p	h_v	285.5-h_p	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	15.30	1.05	270.20	83.8	1.000	83.8	.31669	12.60
.0635	15.65	2.50	269.85	130.0	.994	128.8	.20268	12.88
.1270	16.00	3.35	269.50	150.0	.991	148.5	.11400	13.17
.1905	16.22	3.90	269.28	162.0	.986	159.7	.05067	13.33
.2540	16.40	4.20	269.10	168.0	.983	165.0	.01267	13.50
.3175	16.55	4.37	268.95	171.5	.979	168.0	.00000	13.61
.3810	16.68	4.40	268.82	172.0	.975	167.7	.01267	13.71
.4445	16.78	4.40	268.72	172.0	.970	166.8	.05067	13.80
.5080	16.85	4.20	268.65	168.0	.965	162.0	.11400	13.87
.5715	16.85	3.75	268.65	159.0	.961	152.8	.20268	13.87
.6350	16.80	3.22	268.70	147.0	.957	140.6	.31669	13.82

45 DEGREE DIAMETER-POINT 7-TEMP.PIPE 313.25 C Abs.

.0000	14.95	.80	270.55	73.2	1.000	73.2	.31669	12.30
.0635	15.50	2.05	270.00	117.2	.994	117.0	.20268	12.75
.1270	15.98	3.20	269.52	146.6	.991	145.0	.11400	13.14
.1905	16.35	3.90	269.15	162.0	.986	159.7	.05067	13.45
.2540	16.58	4.20	268.92	168.0	.983	165.0	.01267	13.63
.3175	16.67	4.30	268.83	170.0	.979	166.5	.00000	13.70
.3810	16.66	4.23	268.84	168.6	.975	164.2	.01267	13.70
.4445	16.65	4.05	268.85	165.0	.970	160.0	.05067	13.70
.5080	16.67	3.78	268.83	159.5	.965	154.0	.11400	13.70
.5715	16.70	3.38	268.80	151.0	.961	145.0	.20268	13.73
.6350	16.78	2.90	268.72	140.0	.957	134.0	.31669	13.80

HORIZONTAL DIAMETER-POINT 8-TEMP.PIPE 311.5 C Abs.

.0000	19.18	.85	266.32	75.7	1.000	75.7	.31669	15.77
.0635	19.85	2.60	265.65	133.0	.994	131.8	.20268	16.32
.1270	20.40	3.75	265.10	159.5	.991	158.0	.11400	16.78
.1905	20.56	4.40	264.94	173.0	.986	170.5	.05067	16.90
.2540	20.55	4.70	264.95	178.5	.983	175.3	.01267	16.90
.3175	20.55	4.82	264.95	181.0	.979	177.2	.00000	16.90
.3810	20.53	4.80	264.97	180.5	.975	176.0	.01267	16.89
.4445	20.52	4.50	264.98	178.5	.970	173.0	.05067	16.89
.5080	20.50	4.05	265.00	166.0	.965	160.0	.11400	16.87
.5715	20.48	3.43	265.02	152.6	.961	146.6	.20268	16.86
.6350	20.45	2.73	265.05	136.0	.957	130.0	.31669	16.83

RUN B

DERIVED DATA

45 DEGREE DIAMETER-POINT 3-TEMP.PIPE 312.5 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	5.80	.90	279.70	76.0	1.000	76.0	.31669	4.77
.0635	6.25	2.40	279.25	124.3	.994	123.6	.20268	5.14
.1270	6.57	3.30	278.93	146.3	.991	145.0	.11400	5.40
.1905	6.75	3.70	278.75	154.8	.986	152.6	.05067	5.55
.2540	6.80	3.83	278.70	157.5	.983	154.9	.01267	5.60
.3175	6.80	3.87	278.70	158.5	.979	155.2	.00000	5.60
.3810	6.81	3.85	278.69	158.0	.975	154.0	.01267	5.61
.4445	6.85	3.80	278.65	157.0	.970	152.3	.05067	5.64
.5080	6.96	3.63	278.54	153.5	.965	148.1	.11400	5.73
.5715	7.10	3.30	278.40	146.3	.961	140.6	.20268	5.84
.6350	7.27	2.77	278.23	134.3	.957	128.5	.31669	5.98

VERTICAL DIAMETER-POINT 3-TEMP.PIPE 312.5 C Abs.

.0000	5.47	.50	280.03	56.9	1.000	56.9	.31669	4.50
.0635	6.30	2.65	279.20	131.0	.994	130.2	.20268	5.18
.1270	6.93	3.86	278.57	158.0	.991	156.5	.11400	5.70
.1905	7.30	4.40	278.20	169.0	.986	166.6	.05067	6.01
.2540	7.50	4.60	278.00	173.0	.983	170.0	.01267	6.17
.3175	7.63	4.60	277.87	173.0	.979	169.3	.00000	6.28
.3810	7.70	4.54	277.80	172.0	.975	167.5	.01267	6.34
.4445	7.75	4.40	277.75	169.0	.970	164.0	.05067	6.38
.5080	7.80	4.13	277.70	164.0	.965	158.3	.11400	6.42
.5715	7.80	3.80	277.70	157.0	.961	151.0	.20268	6.42
.6350	7.80	3.47	277.70	150.3	.957	143.8	.31669	6.42

HORIZONTAL DIAMETER-POINT 3-TEMP.PIPE 312.5 C Abs.

.0000	6.60	1.35	278.90	93.5	1.000	93.5	.31669	5.43
.0635	6.73	2.83	278.77	135.5	.994	134.7	.20268	5.54
.1270	6.86	3.70	278.64	158.0	.991	156.5	.11400	5.56
.1905	6.98	4.00	278.52	161.0	.986	158.7	.05067	5.74
.2540	7.12	4.16	277.38	164.6	.983	161.9	.01267	5.85
.3175	7.25	4.26	277.25	167.0	.979	163.5	.00000	5.97
.3810	7.37	4.30	277.13	167.5	.975	163.3	.01267	6.06
.4445	7.50	4.30	277.00	167.5	.970	162.5	.05067	6.17
.5080	7.30	4.19	277.87	165.0	.965	159.3	.11400	6.28
.5715	7.76	3.92	277.74	159.6	.961	153.5	.20268	6.38
.6350	7.88	3.40	277.62	149.0	.957	142.5	.31669	6.48

RUN B

DERIVED DATA

45 DEGREE DIAMETER-POINT 4-TEMP.PIPE 312.5 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	8.55	1.85	276.95	109.5	1.000	109.5	.31669	7.04
.0635	9.16	2.90	276.34	137.3	.994	136.5	.20268	7.54
.1270	9.57	3.78	275.93	157.0	.991	155.6	.11400	7.87
.1905	9.80	4.50	275.70	171.0	.986	168.6	.05068	8.06
.2540	9.95	4.94	275.55	179.0	.983	176.0	.01267	8.18
.3175	10.04	5.14	275.46	183.0	.979	179.0	.00000	8.30
.3810	10.10	5.14	275.40	183.0	.975	178.4	.01267	8.32
.4445	10.15	5.00	275.35	180.5	.970	175.0	.05067	8.35
.5080	10.19	4.70	275.31	175.0	.965	169.0	.11400	8.38
.5715	10.21	4.30	275.29	167.5	.965	161.0	.20268	8.40
.6350	10.25	3.78	275.25	157.0	.957	150.2	.31669	8.43

HORIZONTAL DIAMETER-POINT 4-TEMP.PIPE 311.0 C Abs.

.0000	8.37	1.20	277.13	88.2	1.000	88.2	.31669	6.89
.0635	9.28	2.70	276.22	132.5	.994	131.7	.20268	7.63
.1270	9.90	3.96	275.60	161.0	.991	159.5	.11400	8.15
.1905	10.26	4.83	275.24	177.0	.986	174.4	.05067	8.43
.2540	10.47	5.30	275.03	186.0	.983	183.0	.01267	8.61
.3175	10.58	5.47	274.92	189.0	.979	185.0	.00000	8.71
.3810	10.63	5.46	274.87	189.0	.975	184.2	.01267	8.75
.4445	10.67	5.30	274.83	186.0	.970	180.4	.05067	8.77
.5080	10.66	4.88	274.84	178.5	.965	172.3	.11400	8.77
.5715	10.63	4.32	274.87	168.0	.961	161.5	.20268	8.75
.6350	10.59	3.64	274.91	154.0	.957	147.3	.31669	8.72

VERTICAL DIAMETER-POINT 4-TEMP.PIPE 311.0 C Abs.

.0000	7.96	.90	277.54	76.3	1.000	76.3	.31669	6.55
.0635	8.20	1.70	277.30	105.0	.994	104.4	.20268	6.75
.1270	8.42	2.45	277.08	126.0	.991	125.0	.11400	6.93
.1905	8.63	3.11	276.87	142.0	.986	140.0	.05067	7.10
.2540	8.80	3.62	276.70	153.0	.983	150.3	.01267	7.24
.3175	8.95	4.08	276.55	163.0	.979	159.6	.00000	7.36
.3810	9.06	4.23	276.44	166.0	.975	161.9	.01267	7.45
.4445	9.16	4.07	276.34	165.6	.970	160.8	.05067	7.54
.5080	9.25	3.70	276.25	155.0	.965	149.6	.11400	7.61
.5715	9.33	3.21	276.17	144.3	.961	138.7	.20268	7.68
.6350	9.38	2.66	276.12	131.5	.957	125.8	.31669	7.72

RUN B

DERIVED DATA

45 DEGREE DIAMETER-POINT 5-TEMP.PIPE 310.0 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .223 h_p
.0000	10.95	1.30	274.55	92.1	1.000	92.1	.31669	9.01
.0635	11.30	2.56	274.20	129.3	.994	128.5	.20268	9.30
.1270	11.66	3.56	273.84	153.0	.991	151.6	.11400	9.59
.1905	12.02	4.26	273.48	167.0	.986	164.60	.05067	9.89
.2540	12.35	4.63	273.15	174.5	.983	171.6	.01267	10.17
.3175	12.64	4.87	272.86	179.0	.979	175.2	.00000	10.40
.3810	12.88	5.00	272.62	181.0	.975	176.3	.01267	10.60
.4445	13.06	5.03	272.44	182.0	.970	176.6	.05067	10.73
.5080	13.17	4.86	272.33	179.0	.965	172.8	.11400	10.83
.5715	13.12	4.42	272.38	170.5	.961	164.0	.20268	10.80
.6350	12.89	3.79	272.61	158.0	.957	151.0	.31669	10.60

45 DEGREE DIAMETER-POINT 5-TEMP.PIPE 310.0 C Abs.

.0000	10.82	1.30	274.68	92.1	1.000	92.1	.31669	8.90
.0635	11.27	2.31	274.23	123.0	.994	122.2	.20268	9.26
.1270	11.67	3.22	273.83	145.5	.991	144.2	.11400	9.60
.1905	12.00	4.00	273.50	162.0	.986	159.7	.05067	9.87
.2540	12.24	4.58	273.26	173.4	.983	170.5	.01267	10.08
.3175	12.39	4.92	273.11	180.0	.979	176.2	.00000	10.20
.3810	12.50	5.02	273.00	181.5	.975	177.0	.01267	10.30
.4445	12.60	4.95	272.90	180.0	.970	174.6	.05067	10.37
.5080	12.67	4.60	272.83	174.0	.965	168.0	.11400	10.42
.5715	12.75	4.13	272.75	165.0	.961	158.6	.20268	10.50
.6350	12.80	3.60	272.70	154.0	.957	147.3	.31669	10.53

VERTICAL DIAMETER-POINT 5-TEMP.PIPE 310.0 C Abs.

.0000	10.54	1.30	274.96	92.1	1.000	92.1	.31669	8.68
.0635	10.82	2.03	274.68	115.1	.994	114.5	.20268	8.91
.1270	11.13	2.72	274.37	133.1	.991	132.0	.11400	9.16
.1905	11.42	3.38	274.08	148.7	.986	146.6	.05067	9.40
.2540	11.70	3.96	273.80	161.2	.983	158.5	.01267	9.63
.3175	11.97	4.42	273.53	170.3	.979	166.7	.00000	9.85
.3810	12.24	4.72	273.26	176.3	.975	172.0	.01267	10.08
.4445	12.44	4.74	273.06	176.6	.970	171.2	.05067	10.24
.5080	12.56	4.50	272.94	172.2	.965	166.2	.11400	10.33
.5715	12.62	4.10	272.88	164.4	.961	158.0	.20268	10.39
.6350	12.60	3.56	272.90	153.2	.957	146.5	.31669	10.37

RUN B

DERIVED DATA

VERTICAL DIAMETER-POINT 6-TEMP.PIPE 312.5 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	12.90	2.26	272.60	122.5	1.000	122.5	.31669	10.62
.0635	13.17	3.23	272.33	146.7	.994	145.8	.20268	10.83
.1270	13.33	3.90	272.17	161.0	.991	159.5	.11400	10.97
.1905	13.43	4.22	272.07	167.6	.986	165.1	.05067	11.07
.2540	13.47	4.38	272.03	170.9	.983	168.0	.01267	11.09
.3175	13.50	4.40	272.00	171.2	.979	168.7	.00000	11.11
.3810	13.52	4.40	271.98	171.3	.975	167.0	.01267	11.13
.4445	13.55	4.37	271.95	170.9	.970	165.8	.05067	11.15
.5080	13.56	4.27	271.94	168.7	.965	162.8	.11400	11.16
.5715	13.58	4.17	271.92	166.8	.961	160.3	.20268	11.18
.6350	13.59	4.02	271.91	163.9	.957	156.7	.31669	11.19

HORIZONTAL DIAMETER-POINT 6-TEMP.PIPE 312.5 C Abs.

.0000	11.96	1.87	273.54	111.1	1.000	111.1	.31669	9.85
.0635	12.10	2.41	273.40	126.4	.994	125.8	.20268	9.95
.1270	12.22	2.76	273.28	135.2	.991	134.0	.11400	10.06
.1905	12.36	2.99	273.14	141.0	.986	139.0	.05067	10.17
.2540	12.50	3.10	273.00	143.3	.983	141.0	.01267	10.30
.3175	12.13	3.20	273.37	145.7	.979	142.7	.00000	9.98
.3810	12.77	3.24	272.73	146.9	.975	143.0	.01267	10.50
.4445	12.91	3.28	272.59	147.8	.970	143.2	.05067	10.62
.5080	13.05	3.30	272.45	148.0	.965	142.9	.11400	10.74
.5715	13.19	3.31	272.31	148.5	.961	142.8	.20268	10.85
.6350	13.33	3.32	272.17	148.7	.957	142.2	.31669	10.98

45 DEGREE DIAMETER-POINT 6-TEMP.PIPE 312.5 C Abs.

.0000	12.25	2.00	273.25	115.1	1.000	115.1	.31669	10.08
.0635	12.72	2.86	272.78	138.0	.994	137.2	.20268	10.47
.1270	13.10	3.50	272.40	152.5	.991	151.0	.11400	10.78
.1905	13.36	3.86	272.14	160.2	.986	158.0	.05067	11.00
.2540	13.48	4.00	272.02	163.2	.983	160.4	.01267	11.10
.3175	13.50	4.03	272.00	164.0	.979	160.6	.00000	11.10
.3810	13.45	4.03	272.05	164.0	.975	160.0	.01267	11.07
.4445	13.37	4.03	272.13	163.9	.970	159.0	.05067	11.00
.5080	13.26	4.03	272.24	163.8	.965	158.0	.11400	10.90
.5715	13.15	4.00	272.35	163.1	.961	157.0	.20268	10.82
.6350	13.00	3.95	272.50	162.0	.957	155.0	.31669	10.70

RUN B

DERIVED DATA

45 DEGREE DIAMETER-POINT 6-TEMP.PIPE 312.5 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	12.82	2.02	272.68	115.2	1.000	115.2	.31669	10.54
.0635	12.93	2.68	272.57	133.2	.994	132.3	.20268	10.64
.1270	13.02	3.13	272.48	144.3	.991	143.0	.11400	10.72
.1905	13.06	3.39	272.44	150.1	.986	148.0	.05067	10.74
.2540	13.09	3.52	272.41	152.9	.983	150.3	.01267	10.77
.3175	13.11	3.58	272.39	154.2	.979	151.0	.00000	10.80
.3810	13.13	3.60	272.37	154.7	.975	150.8	.01267	10.81
.4445	13.15	3.58	272.35	154.3	.970	149.7	.05067	10.82
.5080	13.16	3.52	272.34	153.0	.965	147.7	.11400	10.83
.5715	13.17	3.48	272.33	152.3	.961	146.4	.20268	10.83
.6350	13.19	3.40	272.31	150.6	.957	144.0	.31669	10.86

45 DEGREE DIAMETER-POINT 7-TEMP.PIPE 315.0 C Abs.

.0000	14.00	1.00	271.50	81.3	1.000	81.3	.31669	11.52
.0635	14.20	2.19	271.30	120.5	.994	119.8	.20268	11.70
.1270	14.37	3.05	271.13	142.0	.991	140.7	.11400	11.82
.1905	14.50	3.62	271.00	155.0	.986	152.8	.05067	11.93
.2540	14.61	3.90	270.89	161.0	.983	158.2	.01267	12.03
.3175	14.72	3.98	270.78	162.5	.979	159.0	.00000	12.12
.3810	14.84	3.96	270.66	162.0	.975	158.0	.01267	12.21
.4445	14.94	3.87	270.56	160.0	.970	155.3	.05067	12.30
.5080	15.05	3.74	270.45	157.6	.965	152.0	.11400	12.39
.5715	15.13	3.44	270.37	151.0	.961	145.2	.20268	12.45
.6350	15.22	2.55	270.28	130.0	.957	124.3	.31669	12.53

45 DEGREE DIAMETER-POINT 7-TEMP.PIPE 315.0 C Abs.

.0000	14.50	1.51	271.00	100.0	1.000	100.0	.31669	11.93
.0635	14.86	2.84	270.64	137.0	.994	136.2	.20268	12.22
.1270	15.16	3.84	270.34	159.5	.991	158.0	.11400	12.47
.1905	15.40	4.50	270.10	173.0	.986	170.6	.05067	12.68
.2540	15.52	4.78	270.98	178.0	.983	175.0	.01267	12.77
.3175	15.60	4.85	269.90	179.5	.979	175.7	.00000	12.83
.3810	15.63	4.82	269.87	179.0	.975	174.5	.01267	12.87
.4445	15.65	4.61	269.85	175.3	.970	170.0	.05067	12.88
.5080	15.65	4.27	269.85	168.7	.965	162.8	.11400	12.88
.5715	15.62	3.80	269.88	159.0	.961	152.8	.20268	12.86
.6350	15.60	3.23	269.90	146.6	.957	140.2	.31669	12.85

RUN B

DERIVED DATA

VERTICAL DIAMETER-POINT 7-TEMP.PIPE 315.0 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	14.16	.80	271.34	73.4	1.000	73.4	.31669	11.16
.0635	14.62	2.61	270.88	132.5	.994	131.8	.20268	12.03
.1270	14.95	3.72	270.55	158.0	.991	156.6	.11400	12.30
.1905	15.11	4.23	270.39	169.0	.986	166.6	.05067	12.43
.2540	15.15	4.42	270.35	173.0	.983	170.0	.01267	12.47
.3175	15.16	4.50	270.34	174.0	.979	170.4	.00000	12.48
.3810	15.15	4.49	270.35	174.0	.975	169.6	.01267	12.47
.4445	15.13	4.40	270.37	172.0	.970	167.0	.05067	12.46
.5080	15.10	4.12	270.40	167.0	.965	161.2	.11400	12.43
.5715	15.05	3.60	270.45	156.0	.961	150.0	.20268	12.39
.6350	14.99	2.45	270.51	128.5	.957	123.0	.31669	12.33

HORIZONTAL DIAMETER-POINT 7-TEMP.PIPE 315.5 C Abs.

.0000	14.43	1.50	271.07	100.4	1.000	100.4	.31669	11.89
.0635	14.56	2.46	270.94	129.0	.994	128.3	.20268	11.98
.1270	14.68	3.28	270.82	148.5	.991	147.0	.11400	12.08
.1905	14.81	3.99	270.69	164.0	.986	161.6	.05067	12.20
.2540	14.94	4.50	270.56	174.0	.983	171.0	.01267	12.30
.3175	15.05	4.73	270.45	178.5	.979	174.8	.00000	12.39
.3810	15.16	4.71	270.34	178.0	.975	173.5	.01267	12.47
.4445	15.26	4.52	270.24	174.5	.970	169.2	.05067	12.56
.5080	15.32	4.22	270.18	169.0	.965	163.1	.11400	12.61
.5715	15.33	3.82	270.17	160.5	.961	154.2	.20268	12.62
.6350	15.32	3.40	270.18	151.5	.957	145.0	.31669	12.61

45 DEGREE DIAMETER-POINT 8-TEMP.PIPE 311.0 C Abs.

.0000	18.25	2.95	267.25	141.0	1.000	141.0	.31669	15.02
.0635	18.78	4.18	266.72	167.6	.994	166.5	.20268	15.44
.1270	19.23	5.25	266.27	188.0	.991	186.0	.11400	15.82
.1905	19.61	6.12	265.89	203.2	.986	200.0	.05067	16.13
.2540	19.90	6.75	265.60	214.0	.983	210.3	.01267	16.38
.3175	20.05	7.03	265.45	218.0	.979	213.3	.00000	16.50
.3810	20.07	7.00	265.43	218.0	.975	212.5	.01267	16.52
.4445	20.06	6.66	265.45	212.0	.970	206.0	.05067	16.50
.5080	19.93	6.00	265.57	201.5	.965	195.5	.11400	16.40
.5715	19.72	5.15	265.78	186.5	.961	179.2	.20268	16.22
.6350	19.47	4.12	266.03	167.0	.957	159.8	.31669	16.01

RUN B

VERTICAL DERIVED DATA

VERTICAL DIAMETER-POINT 8-TEMP.PIPE 311.0 C Abs.

Diam. Feet	h_p	h_v	285.5-h_p	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .225 h_p
.0000	17.69	2.10	267.81	119.0	1.000	119.0	.31669	14.48
.0635	18.37	3.85	268.13	161.0	.994	160.0	.20268	15.11
.1270	18.98	5.18	266.52	187.0	.991	185.4	.11400	15.61
.1905	19.47	6.02	266.03	201.5	.986	198.5	.05067	16.01
.2540	19.85	6.70	265.65	213.0	.983	209.4	.01267	16.33
.3175	20.10	7.20	265.40	221.0	.979	216.2	.00000	16.54
.3810	20.70	7.26	265.30	222.0	.975	216.2	.01267	16.63
.4445	20.20	6.93	265.30	216.5	.970	210.0	.05067	16.63
.5080	20.08	6.30	265.42	206.6	.965	199.6	.11400	16.53
.5715	19.90	5.45	265.60	192.0	.961	184.3	.20268	16.38
.6350	19.70	4.44	265.80	173.0	.957	165.5	.31669	16.21

HORIZONTAL DIAMETER-POINT 8-TEMP.PIPE 311.0 C Abs.

.0000	17.10	2.22	268.40	122.0	1.000	122.0	.31669	14.07
.0635	17.67	3.20	267.83	146.6	.994	145.8	.20268	14.53
.1270	18.00	4.04	267.50	164.6	.991	163.0	.11400	14.80
.1905	18.17	4.73	267.33	178.4	.986	176.0	.05067	14.94
.2540	18.30	5.22	267.20	187.3	.983	184.0	.01267	15.06
.3175	18.40	5.44	267.10	191.0	.979	187.0	.00000	15.14
.3810	18.45	5.32	267.05	189.0	.975	184.2	.01267	15.19
.4445	18.50	5.00	267.00	183.2	.970	177.8	.05067	15.23
.5080	18.52	4.50	266.98	174.0	.965	168.0	.11400	15.24
.5715	18.55	3.85	266.95	161.0	.961	154.7	.20268	15.27
.6350	18.56	3.15	266.94	145.7	.957	139.3	.31669	15.28

45 DEGREE DIAMETER-POINT 8-TEMP.PIPE 311.0 C Abs.

.0000	16.50	0.80	269.00	73.0	1.000	73.0	.31669	13.58
.0635	17.40	2.60	268.10	132.0	.994	131.2	.20268	14.31
.1270	17.90	3.90	267.60	162.0	.991	160.5	.11400	14.72
.1905	18.10	4.60	267.40	176.0	.986	174.6	.05067	14.90
.2540	18.22	4.96	267.28	182.5	.983	179.4	.01267	15.00
.3175	18.30	5.20	267.20	187.0	.979	183.0	.00000	15.07
.3810	18.37	5.16	267.13	186.0	.975	181.3	.01267	15.10
.4445	18.45	4.88	267.05	181.0	.970	175.6	.05067	15.19
.5080	18.50	4.40	267.00	172.0	.965	166.0	.11400	15.22
.5715	18.55	3.80	266.95	160.0	.961	153.8	.20268	15.26
.6350	18.60	3.12	266.90	145.0	.957	138.8	.31669	15.30

[illegible]

RUN B

DERIVED DATA

45 DEGREE DIAMETER-POINT 5-TEMP.PIPE 309.0 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	7.76	1.17	277.74	106.8	1.000	106.8	.31669	6.38
.0635	8.50	2.64	277.00	130.3	.994	129.5	.20268	7.00
.1270	9.21	3.94	276.29	159.4	.991	158.0	.11400	7.58
.1905	9.82	4.99	275.68	179.6	.986	177.0	.05067	8.08
.2540	10.32	5.77	275.18	193.5	.983	190.0	.01267	8.50
.3175	10.70	6.20	274.80	200.5	.979	196.0	.00000	8.82
.3810	10.78	6.27	274.72	202.0	.975	197.0	.01267	8.88
.4445	10.70	6.03	274.80	198.0	.970	192.0	.05067	8.81
.5080	10.50	5.58	275.00	190.2	.965	183.5	.11400	8.65
.5715	10.22	4.98	275.28	179.5	.961	172.5	.20268	8.42
.6350	9.84	4.29	275.66	166.8	.957	159.5	.31669	8.10

45 DEGREE DIAMETER-POINT 5-TEMP.PIPE 309.0 C Abs.

.0000	7.90	2.00	277.60	113.5	1.000	113.5	.31669	6.50
.0635	8.42	3.08	277.08	140.9	.994	140.0	.20268	6.83
.1270	8.90	3.94	276.60	159.1	.991	157.7	.11400	7.33
.1905	9.30	4.61	276.20	172.6	.986	170.0	.05067	7.65
.2540	9.62	5.03	275.88	180.4	.983	177.3	.01267	7.92
.3175	9.84	5.21	275.66	184.0	.979	180.0	.00000	8.10
.3810	9.96	5.20	275.54	183.4	.975	178.8	.01267	8.20
.4445	10.00	5.05	275.50	181.0	.970	175.5	.05067	8.23
.5080	9.97	4.80	275.53	176.3	.965	170.0	.11400	8.20
.5715	9.85	4.44	275.65	169.6	.961	163.0	.20268	8.11
.6350	9.66	4.00	275.84	161.0	.957	154.0	.31669	7.95

VERT. DIAMETER - POINT 5 - TEMP.PIPE 309.0 C Abs.

.0000	8.16	2.00	277.34	113.5	1.000	113.5	.31669	6.72
.0635	8.70	3.11	276.80	141.3	.994	140.3	.20268	7.16
.1270	9.14	4.08	276.36	162.0	.991	160.4	.11400	7.52
.1905	9.50	4.70	276.00	174.0	.986	171.5	.05067	7.82
.2540	9.77	5.08	275.73	181.2	.983	178.0	.01267	8.04
.3175	9.97	5.25	275.53	184.2	.979	180.2	.00000	8.20
.3810	10.09	5.28	275.41	185.0	.975	180.3	.01267	8.30
.4445	10.09	5.18	275.41	183.0	.970	177.5	.05067	8.30
.5080	10.00	4.94	275.50	179.0	.965	172.9	.11400	8.23
.5715	9.84	4.56	275.66	172.0	.961	165.2	.20268	8.10
.6350	9.41	3.83	276.09	157.3	.957	150.4	.31669	7.75

RUN C

DERIVED DATA

45 DEGREE DIAMETER-POINT 6-TEMP.PIPE 309.5 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Dz. .823 h_p
.0000	9.62	1.40	275.88	95.3	1.000	95.3	.31669	7.92
.0635	9.84	2.68	275.66	132.0	.994	131.1	.20268	8.10
.1270	10.00	3.22	275.50	144.2	.991	143.0	.11400	8.23
.1905	10.09	3.50	274.41	151.0	.986	148.9	.05067	8.30
.2540	10.16	3.65	275.34	154.0	.983	151.3	.01267	8.36
.3175	10.21	3.73	275.29	155.5	.979	152.1	.00000	8.41
.3810	10.27	3.80	275.23	157.0	.975	153.0	.01267	8.45
.4445	10.29	3.83	275.21	157.6	.970	152.8	.05067	8.47
.5080	10.30	3.80	275.20	157.0	.965	151.4	.11400	8.48
.5715	10.30	3.70	275.20	155.0	.961	149.0	.20268	8.48
.6350	10.30	3.48	275.20	150.3	.957	144.0	.31669	8.48

45 DEGREE DIAMETER-POINT 6-TEMP.PIPE 309.5 C Abs.

.0000	10.14	2.33	275.36	123.0	1.000	123.0	.31669	8.35
.0635	10.53	3.52	274.97	151.2	.994	150.2	.20268	8.68
.1270	10.80	4.11	274.70	162.6	.991	161.0	.11400	8.89
.1905	11.00	4.40	274.00	169.0	.986	166.7	.05067	9.06
.2540	11.08	4.53	274.42	171.6	.983	168.6	.01267	9.12
.3175	11.10	4.60	274.40	173.0	.979	169.3	.00000	9.14
.3810	11.09	4.61	274.41	173.0	.975	168.5	.01267	9.13
.4445	11.04	4.65	274.46	173.8	.970	168.5	.05067	9.10
.5080	11.00	4.70:	274.50	175.0	.965	168.9	.11400	9.06
.5715	10.90	4.70	274.60	175.0	.961	168.2	.20268	8.98
.6350	10.80	4.70	274.70	175.0	.957	167.5	.31669	8.90

HORIZONTAL DIAMETER-POINT 6-TEMP.PIPE 309.5 C Abs.

.0000	9.86	2.16	275.64	118.3	1.000	118.3	.31669	8.12
.0635	10.31	3.16	275.19	143.0	.994	142.1	.20268	8.50
.1270	10.54	3.66	274.96	154.1	.991	152.7	.11400	8.69
.1905	10.62	3.91	274.88	159.2	.986	157.0	.05067	8.75
.2540	10.67	4.10	274.83	163.0	.983	160.1	.01267	8.78
.3175	10.70	4.17	274.80	164.6	.979	161.0	.00000	8.81
.3810	10.70	4.20	274.80	165.0	.975	160.8	.01267	8.81
.4445	10.70	4.15	274.80	165.0	.970	160.0	.05067	8.81
.5080	10.70	4.13	274.80	163.80	.965	158.0	.11400	8.81
.5715	10.70	4.10	274.80	163.0	.961	156.7	.20268	8.81
.6350	10.70	4.06	274.80	162.5	.957	155.4	.31669	8.81

RUN C

DERIVED DATA

VERTICAL DIAMETER-POINT 6-TEMP.PIPE 309.5 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	10.16	2.00	275.34	113.9	1.000	113.9	.31669	8.36
.0635	10.53	3.47	274.97	150.0	.994	149.0	.20268	8.68
.1270	10.78	4.00	274.72	162.8	.991	161.1	.11400	8.87
.1905	10.91	4.36	274.59	168.1	.986	165.8	.05067	8.99
.2540	10.98	4.50	274.52	171.0	.983	168.0	.01267	9.04
.3175	11.00	4.55	274.50	172.0	.979	168.3	.00000	9.06
.3810	10.99	4.52	274.51	171.3	.975	167.0	.01267	9.05
.4445	10.96	4.45	274.45	170.0	.970	164.9	.05067	9.02
.5080	10.93	4.37	274.57	168.8	.965	162.8	.11400	9.01
.5715	10.90	4.27	274.60	166.6	.961	160.0	.20268	8.98
.6350	10.87	4.15	274.63	164.1	.957	157.0	.31669	8.95

45 DEGREE DIAMETER-POINT 7-TEMP.PIPE 308.0 C Abs.

.0000	11.51	1.35	273.99	93.7	1.000	93.7	.31669	9.49
.0635	12.01	2.70	273.49	132.8	.994	132.0	.20268	9.90
.1270	12.32	3.76	273.18	156.7	.991	155.1	.11400	10.14
.1905	12.54	4.40	272.96	169.5	.986	167.0	.05067	10.33
.2540	12.70	4.67	272.80	174.9	.983	171.9	.01267	10.44
.3175	12.77	4.73	272.73	176.0	.979	172.2	.00000	10.50
.3810	12.78	4.72	272.72	175.8	.975	171.2	.01267	10.52
.4445	12.75	4.63	272.75	174.0	.970	168.8	.05067	10.50
.5080	12.72	4.34	272.78	168.5	.965	162.5	.11400	10.46
.5715	12.70	3.83	272.80	158.1	.961	152.0	.20268	10.44
.6350	12.68	2.75	272.82	134.0	.957	128.2	.31669	10.43

HORIZONTAL DIAMETER-POINT 7-TEMP.PIPE 308.0 C Abs.

.0000	10.80	.50	274.70	57.0	1.000	57.0	.31669	8.90
.0635	11.51	2.14	273.49	118.0	.994	117.2	.20268	9.48
.1270	11.92	3.45	273.58	150.0	.991	148.6	.11400	9.82
.1905	12.20	4.20	273.30	165.6	.986	163.2	.05067	10.03
.2540	12.30	4.46	273.20	170.7	.983	167.8	.01267	10.12
.3175	12.38	4.53	273.12	172.0	.979	168.3	.00000	10.19
.3810	12.36	4.50	273.14	171.3	.975	167.0	.01267	10.17
.4445	12.30	4.40	273.20	169.5	.970	164.3	.05067	10.12
.5080	12.24	4.13	273.26	164.0	.965	158.1	.11400	10.08
.5715	12.19	3.58	273.31	153.0	.961	147.0	.20268	10.02
.6350	12.07	2.20	273.43	119.8	.957	114.7	.31669	9.94

RUN C

DERIVED DATA

VERTICAL DIAMETER-POINT 7-TEMP.PIPE 308.0 C ABs.

Diam. Feet	h_p	h_v	285.5-h_p	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	10.60	.86	274.90	74.7	1.000	74.7	.31669	8.73
.0635	11.27	2.35	274.23	123.4	.994	122.7	.20268	9.28
.1270	11.64	3.50	273.86	151.1	.991	149.7	.11400	9.60
.1905	11.90	4.11	273.60	163.7	.986	161.2	.05067	9.80
.2540	12.04	4.38	273.46	169.0	.983	166.0	.01267	9.92
.3175	12.12	4.43	273.38	170.0	.979	166.4	.00000	9.98
.3810	12.18	4.40	273.32	169.4	.975	165.0	.01267	10.02
.4445	12.20	4.28	273.30	167.0	.970	162.0	.05067	10.03
.5080	12.20	4.06	273.30	163.0	.965	157.3	.11400	10.03
.5715	12.20	3.65	273.30	154.4	.961	148.5	.20268	10.03
.6350	12.20	2.73	273.30	133.5	.957	127.8	.31669	10.03

45 DEGREE DIAMETER-POINT 7-TEMP.PIPE 308.0 C Abs.

.0000	10.39	.50	275.11	57.0	1.000	57.0	.31669	8.55
.0635	10.91	1.85	274.59	109.6	.994	108.9	.20268	8.89
.1270	11.39	2.97	274.11	139.0	.991	137.8	.11400	9.37
.1905	11.71	3.65	273.79	154.2	.986	152.0	.05067	9.65
.2540	11.92	4.00	273.58	161.6	.983	159.0	.01267	9.82
.3175	12.07	4.14	273.43	164.2	.979	160.7	.00000	9.94
.3810	12.10	4.18	273.40	165.0	.975	160.8	.01267	9.96
.4445	12.13	4.10	273.37	163.6	.970	158.6	.05067	10.00
.5080	12.15	3.97	273.35	161.0	.965	155.2	.11400	10.01
.5715	12.18	3.78	273.32	157.0	.961	150.8	.20268	10.02
.6350	12.20	3.50	273.30	151.0	.957	144.4	.31669	10.03

HORIZONTAL DIAMETER-POINT 8-TEMP.PIPE 311.5 C Abs.

.0000	14.60	.75	270.90	70.3	1.000	70.3	.31669	12.01
.0635	15.24	2.84	270.26	136.7	.994	135.8	.20268	12.54
.1270	15.62	4.17	269.88	166.0	.991	164.4	.11400	12.86
.1905	15.81	4.90	269.69	180.0	.986	177.5	.05067	13.01
.2540	15.91	5.34	269.59	188.0	.983	184.8	.01267	13.10
.3175	15.96	5.60	269.54	192.5	.979	188.3	.00000	13.13
.3810	15.97	5.60	269.53	192.5	.975	187.5	.01267	13.14
.4445	16.00	5.38	269.50	189.0	.970	183.3	.05067	13.17
.5080	16.00	4.83	269.50	179.0	.965	172.7	.11400	13.17
.5715	15.92	4.10	269.58	164.7	.961	158.2	.20268	13.10
.6350	15.80	3.15	269.70	144.3	.957	138.2	.31669	13.00

[illegible]

RUN C

DERIVED DATA

VERTICAL DIAMETER-POINT 8-TEMP.PIPE 311.5 C Abs.

DIAM. Feet.	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. #823 h_p
.0000	15.45	1.40	270.05	96.2	1.000	96.2	.31669	12.71
.0635	16.20	3.80	269.30	158.6	.994	157.6	.20267	13.33
.1270	16.78	5.48	268.72	190.3	.991	188.5	.11400	13.80
.1905	17.21	6.44	268.29	206.6	.986	204.0	.05067	14.18
.2540	17.60	6.97	267.90	215.6	.983	212.0	.01267	14.49
.3175	17.92	7.33	267.58	221.0	.979	216.2	.00000	14.76
.3810	18.14	7.54	266.36	224.4	.975	219.0	.01267	14.93
.4445	18.20	7.50	266.30	224.0	.970	217.2	.05067	14.98
.5080	18.03	7.00	267.47	216.0	.965	208.2	.11400	14.83
.5715	17.55	5.95	267.95	198.8	.961	191.0	.20268	14.44
.6350	16.80	4.50	268.70	173.0	.957	165.5	.31669	13.82

45 DEGREE DIAMETER-POINT 8-TEMP.PIPE 311.5 C Abs.

.0000	15.15	1.85	270.35	110.6	1.000	110.6	.31669	12.47
.0635	16.21	3.75	269.29	157.9	.994	156.9	.20268	13.35
.1270	16.81	5.25	268.69	187.0	.991	185.1	.11400	13.83
.1905	17.21	6.27	268.29	204.5	.986	201.6	.05067	14.18
.2540	17.50	6.87	268.00	214.0	.983	210.1	.01267	14.40
.3175	17.70	7.25	267.80	220.0	.979	215.2	.00000	14.58
.3810	17.70	7.32	267.80	219.5	.975	214.0	.01267	14.58
.4445	17.62	6.90	267.88	214.7	.970	208.2	.05067	14.50
.5080	17.48	6.25	268.02	204.0	.965	196.8	.11400	14.39
.5715	17.28	5.40	268.22	189.6	.961	182.2	.20268	14.22
.6350	17.00	4.32	268.50	169.5	.957	162.1	.31669	13.99

45 DEGREE DIAMETER-POINT 8-TEMP.PIPE 311.5 C Abs.

.0000	14.10	.86	271.40	75.2	1.000	75.2	.31669	11.60
.0635	15.08	2.85	270.42	137.2	.994	136.3	.20268	12.40
.1270	15.63	4.23	269.87	167.5	.991	166.0	.11400	12.87
.1905	15.88	5.08	269.62	183.6	.986	181.0	.05067	13.07
.2540	15.95	5.38	269.55	189.0	.983	185.8	.01267	13.12
.3175	15.90	5.40	269.60	189.2	.979	185.0	.00000	13.10
.3810	15.82	5.33	269.68	188.0	.975	183.2	.01267	13.02
.4445	15.91	5.22	269.59	186.0	.970	180.2	.05067	13.10
.5080	16.06	4.87	269.44	179.8	.965	173.5	.11400	13.20
.5715	16.12	4.23	269.38	167.6	.961	161.0	.20268	13.17
.6350	16.14	3.32	269.36	148.4	.957	142.0	.31669	13.29

RUN D

DERIVED DATA

VERTICAL DIAMETER-POINT 1-TEMP.PIPE 302.5 C Abs.

Diam. Feet.	h_p	h_v	$285.5-h_p$	V	Corr, Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. $.823\ h_p$
.0000	7.52	1.65	277.48	102.0	1.000	102.0	.31669	6.19
.0635	8.30	3.35	277.20	145.5	.994	144.5	.20268	6.84
.1270	8.75	4.27	276.75	164.2	.991	162.8	.11400	7.20
.1905	8.90	4.65	276.60	171.5	.986	169.0	.05067	7.33
.2540	8.95	5.00	276.55	177.8	.983	174.8	.01268	7.37
.3175	8.95	5.35	276.55	184.0	.979	180.2	.00000	7.37
.3810	9.50	5.70	276.50	190.0	.975	185.3	.01267	7.41
.4445	9.15	6.05	276.35	195.6	.970	189.8	.05067	7.54
.5080	9.37	6.30	276.13	200.0	.965	193.0	.11400	7.72
.5715	9.65	6.00	275.85	195.0	.961	187.5	.20268	7.95
.6350	9.95	5.15	275.65	181.0	.957	173.0	.31669	8.20

HORIZONTAL DIAMETER-POINT 1-TEMP.PIPE 302.5 C Abs.

.0000	7.50	1.60	278.00	100.4	1.000	100.4	.31669	6.16
.0635	7.80	2.95	277.70	136.5	.994	135.8	.20268	6.42
.1270	8.07	3.75	277.43	153.8	.991	152.4	.11400	6.64
.1905	8.23	4.17	277.27	162.5	.986	160.1	.05067	6.78
.2540	8.10	4.35	277.40	166.0	.983	163.2	.01267	6.66
.3175	8.10	4.42	277.40	167.2	.979	163.9	.00000	6.66
.3810	8.37	4.42	277.13	167.2	.975	163.0	.01267	6.89
.4445	8.72	4.50	276.78	169.0	.970	164.0	.05067	7.18
.5080	9.00	4.60	276.50	170.8	.965	164.9	.11400	7.40
.5715	9.02	4.83	276.48	175.0	.961	168.2	.20268	7.42
.6350	8.80	5.10	276.70	179.7	.957	172.0	.31669	7.25

45 DEGREE DIAMETER-POINT 1-TEMP.PIPE 302.5 C Abs.

.0000	7.25	1.25	278.25	88.7	1.000	88.7	.31669	5.96
.0635	8.05	2.80	277.45	132.6	.994	131.8	.20268	6.63
.1270	8.40	3.75	277.10	154.3	.991	153.0	.11400	6.91
.1905	8.45	4.18	277.05	162.7	.986	160.2	.05067	6.95
.2540	8.40	4.55	277.10	169.7	.983	166.8	.01267	6.91
.3175	8.58	4.92	277.12	176.5	.979	173.0	.00000	6.90
.3810	8.40	5.30	277.10	183.0	.975	178.3	.01267	6.91
.4445	8.50	5.68	277.00	189.8	.970	184.0	.05067	6.99
.5080	8.70	5.75	276.80	191.1	.965	184.3	.11400	7.16
.5715	8.95	5.25	276.55	182.3	.961	175.2	.20268	7.36
.6350	8.95	4.00	276.55	159.3	.957	152.3	.31669	7.36

RUN D

DERIVED DATA

HORIZONTAL DIAMETER-POINT 2-TEMP.PIPE 303.0 C Abs.

Diam. Feet.	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. $.823\ h_p$
.0000	8.70	1.15	276.80	85.3	1.000	85.3	.31669	7.16
.0635	9.35	3.20	276.15	142.8	.994	141.9	.20268	7.70
.1270	9.75	4.50	275.75	169.0	.991	167.4	.11400	8.02
.1905	10.00	5.10	275.50	180.0	.986	177.5	.05067	8.23
.2540	10.10	5.20	275.40	182.0	.983	179.0	.01267	8.32
.3175	10.20	5.20	275.30	182.0	.979	178.2	.00000	8.39
.3810	10.20	4.95	275.30	177.7	.975	173.0	.01267	8.39
.4445	10.20	4.80	275.30	175.0	.970	169.8	.05067	8.39
.5080	10.20	4.50	275.30	169.2	.965	163.1	.11400	8.39
.5715	10.20	4.10	275.30	161.7	.961	155.2	.20268	8.39
.6350	10.20	3.30	275.30	145.0	.957	138.8	.31669	8.39

VERTICAL DIAMETER-POINT 2-TEMP.PIPE 303.0 C Abs.

.0000	8.20	1.15	277.30	85.2	1.000	85.2	.31669	6.75
.0635	9.15	2.95	276.35	136.9	.994	136.0	.20268	7.53
.1270	9.60	4.00	275.90	159.4	.991	158.0	.11400	7.91
.1905	9.80	4.55	275.70	170.0	.986	167.6	.05067	8.07
.2540	9.95	4.80	275.55	174.7	.983	171.8	.01267	8.19
.3175	10.00	5.00	275.50	178.3	.979	174.7	.00000	8.23
.3810	10.00	5.08	275.50	180.0	.975	175.3	.01267	8.23
.4445	10.20	5.10	275.30	180.0	.970	174.6	.05067	8.39
.5080	10.35	4.90	275.15	176.8	.965	170.4	.11400	8.52
.5715	10.35	4.30	275.15	165.5	.961	159.9	.20268	8.52
.6350	10.20	3.30	275.30	145.0	.957	138.8	.31669	8.39

45 DEGREE DIAMETER-POINT 2-TEMP.PIPE 303.0 C Abs.

.0000	8.65	1.15	276.85	85.3	1.000	85.3	.31669	7.12
.0635	9.27	3.00	276.23	138.0	.994	137.1	.20268	7.63
.1270	9.60	4.25	275.90	164.2	.991	162.7	.11400	7.91
.1905	9.80	4.85	275.70	175.5	.986	173.0	.05067	8.07
.2540	9.90	5.10	275.60	180.0	.983	177.0	.01267	8.15
.3175	9.90	5.00	275.60	178.4	.979	174.7	.00000	8.15
.3810	9.90	4.85	275.60	175.7	.975	171.1	.01267	8.15
.4445	9.85	4.60	275.65	171.1	.970	166.0	.05067	8.11
.5080	9.90	4.20	275.60	163.5	.965	157.7	.11400	8.15
.5715	10.00	3.85	275.50	156.6	.961	150.4	.20268	8.23
.6350	10.20	3.40	275.30	147.2	.957	140.8	.31669	8.39

RUN D

DERIVED DATA

HORIZONTAL DIAMETER-POINT 3-TEMP.PIPE 302.5 C Abs.

Diam. Feet.	h_p	h_v	$285.5-h_p$	V	Corr, Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	9.80	.90	275.70	74.3	1.000	74.3	.31669	8.06
.0635	10.90	2.90	274.60	136.1	.994	135.3	.20268	8.98
.1270	11.50	4.25	274.00	164.8	.991	163.2	.11400	9.46
.1905	11.8	4.95	273.70	178.2	.986	175.6	.05067	9.71
.2540	12.00	5.30	273.50	184.3	.983	181.2	.01267	9.88
.3175	12.20	5.60	273.30	189.5	.979	185.7	.00000	10.05
.3810	12.35	5.80	273.15	192.7	.975	187.9	.01267	10.17
.4445	12.30	5.70	273.20	191.3	.970	185.5	.05067	10.13
.5080	12.30	5.30	273.20	184.4	.965	178.0	.11400	10.13
.5715	12.35	4.70	273.15	173.6	.961	166.7	.20268	10.17
.6350	12.35	3.90	273.15	158.2	.957	151.3	.31669	10.17

VERTICAL DIAMETER -POINT 3-TEMP.PIPE 302.5 C Abs.

.0000	10.80	1.05	274.70	81.7	1.000	81.7	.31669	8.89
.0635	11.90	3.00	273.60	141.4	.994	140.5	.20268	9.80
.1270	12.60	4.50	272.90	170.1	.991	168.6	.11400	10.37
.1905	13.10	5.55	272.40	189.0	.986	186.3	.05067	10.78
.2540	13.45	6.15	272.05	198.9	.983	195.4	.01267	11.07
.3175	13.80	6.40	271.70	203.3	.979	198.9	.00000	11.36
.3810	13.90	6.75	271.60	209.0	.975	203.7	.01267	11.44
.4445	13.80	6.50	271.70	204.8	.970	198.7	.05067	11.36
.5080	13.65	6.00	271.85	196.9	.965	189.0	.11400	11.23
.5715	13.45	5.00	272 05	179.4	.961	172.4	.20268	11.07
.6350	13.15	3.80	272.35	156.1	.957	149.2	.31669	10.82

45 DEGREE DIAMETER-POINT 3-TEMP.PIPE 302.5 C Abs.

.0000	10.50	1.20	275.00	74.8	1.000	74.8	.31669	8.64
.0635	10.85	2.90	274.65	136.10	.994	135.3	.20268	8.93
.1270	11.15	4.00	274.35	159.9	.991	158.4	.11400	9.17
.1905	11.40	4.70	274.10	173.3	.986	170.8	.05067	9.38
.2540	11.60	5.15	273.90	181.5	.983	178.4	.01267	9.55
.3175	11.70	5.50	273.80	187.5	.979	183.6	.00000	9.63
.3810	11.70	5.60	273.80	189.3	.975	184.6	.01267	9.63
.4445	11.50	5.25	274.00	183.0	.970	177.4	.05067	9.46
.5080	11.25	4.55	274.25	171.2	.965	165.2	.11400	9.26
.5715	11.15	3.65	274.35	152.7	.961	146.7	.20268	9.17
.6350	11.10	2.50	274.40	126.3	.957	120.8	.31669	9.13

RUN D

DERIVED DATA

VERTICAL DIAMETER-POINT 4-TEMP.PIPE 302.5 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	12.90	.80	272.80	71.7	1.000	71.7	.31669	10.62
.0635	13.40	2.20	272.10	119.0	.994	118.3	.20268	11.04
.1270	13.90	3.60	271.60	141.2	.991	140.0	.11400	11.45
.1905	14.30	4.80	271.20	176.2	.986	173.7	.05067	11.78
.2540	14.65	5.70	270.85	192.0	.983	188.7	.01267	12.06
.3175	14.85	6.00	270.65	197.2	.979	193.0	.00000	12.22
.3810	15.00	5.90	270.50	195.7	.975	190.8	.01267	12.35
.4445	15.00	5.60	270.50	190.4	.970	184.8	.05067	12.35
.5080	15.00	5.20	270.50	183.5	.965	177.0	.11400	12.35
.5715	15.00	4.70	270.50	174.6	.961	167.7	.20268	12.35
.6350	15.00	4.10	270.50	163.0	.957	156.0	.31669	12.35

HORIZONTAL DIAMETER-POINT 4-TEMP.PIPE 302.5 C Abs.

.0000	13.20	1.30	272.30	91.3	1.000	91.3	.31669	10.88
.0635	14.10	3.40	271.40	148.3	.994	147.5	.20268	11.60
.1270	14.50	4.50	271.00	170.7	.991	169.7	.11400	11.94
.1905	14.75	5.10	270.75	181.8	.986	179.1	.05067	12.14
.2540	14.90	5.60	270.60	190.4	.983	187.3	.01267	12.27
.3175	14.90	5.90	270.60	195.5	.979	191.5	0.00000	12.27
.3810	15.00	5.90	270.50	195.5	.975	190.5	.01267	12.36
.4445	15.05	5.60	270.45	190.5	.970	184.9	.05067	12.40
.5080	15.10	5.00	270.40	180.0	.965	173.7	.11400	12.43
.5715	15.20	4.30	270.30	167.0	.961	160.5	.20268	12.51
.6350	15.30	3.50	270.20	150.8	.957	144.3	.31669	12.60

45 DEGREE DIAMETER-POINT 4-TEMP.PIPE 302.5 C Abs.

.0000	13.30	1.50	272.20	98.2	1.000	98.2	.31669	10.96
.0635	14.00	3.10	271.50	141.2	.994	140.4	.20268	11.53
.1270	14.40	4.30	271.10	167.0	.991	165.4	.11400	11.86
.1905	14.60	5.00	270.90	179.8	.986	177.2	.05067	12.03
.2540	14.80	5.50	270.70	188.7	.983	185.6	.01267	12.19
.3175	14.90	5.80	270.60	193.7	.979	189.6	.00000	12.27
.3810	14.95	5.85	270.55	194.5	.975	189.5	.01267	12.31
.4445	14.97	5.55	270.53	189.5	.970	183.9	.05067	12.33
.5080	15.00	5.05	270.50	181.0	.965	174.6	.11400	12.36
.5715	15.00	4.40	270.50	169.0	.961	162.3	.20268	12.36
.6350	15.00	3.60	270.50	152.8	.957	146.2	.31669	12.36

RUN D

DERIVED DATA

VERTICAL DIAMETER-POINT 5-TEMP.PIPE 302.0 C Abs.

Diam. Feet	h_p	h_v	285.5-h_p	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	16.25	1.95	269.25	112.6	1.000	112.6	.31669	13.38
.0635	16.50	3.10	269.00	142.0	.994	141.2	.20268	13.59
.1270	16.80	4.10	268.70	163.6	.991	162.0	.11400	13.83
.1905	17.05	4.80	268.45	177.20	.986	174.7	.05067	14.03
.2540	17.25	5.40	268.25	187.7	.983	184.6	.01267	14.20
.3175	17.40	5.80	268.10	194.6	.979	190.5	.00000	14.32
.3810	17.50	5.85	268.00	195.6	.975	190.5	.01267	14.42
.4445	17.50	5.60	268.00	191.3	.970	185.6	.05067	14.42
.5080	17.50	5.25	268.00	185.4	.965	179.0	.11400	14.42
.5715	17.40	4.65	268.10	174.5	.961	167.7	.20268	14.32
.6350	17.25	4.00	268.25	161.7	.957	154.7	.31669	14.20

45 DEGREE DIAMETER-POINT 5-TEMP.PIPE 302.0 C Abs.

.0000	14.90	.30	270.60	44.1	1.000	44.1	.31669	12.27
.0635	15.95	2.40	269.55	124.9	.994	124.3	.20268	13.13
.1270	16.55	3.90	268.95	159.5	.991	158.0	.11400	13.62
.1905	16.90	4.80	268.60	177.0	.986	174.5	.05067	13.91
.2540	17.20	5.30	268.30	186.0	.983	183.0	.01267	14.17
.3175	17.30	5.60	268.20	191.5	.979	187.5	.00000	14.24
.3810	17.45	5.80	268.05	194.7	.975	189.8	.01267	14.38
.4445	17.55	5.75	267.95	193.8	.970	188.0	.05067	14.45
.5080	17.60	5.40	267.90	188.0	.965	181.5	.11400	14.50
.5715	17.60	4.60	267.90	173.7	.961	167.0	.20268	14.50
.6350	17.55	3.50	267.95	151.70	.957	145.2	.31669	14.45

45 DEGREE DIAMETER-POINT 5-TEMP.PIPE 302.0 C Abs.

.0000	14.75	.70	270.75	67.2	1.000	67.2	.31669	12.14
.0635	15.40	1.95	270.10	112.5	.994	111.8	.20268	12.68
.1270	15.95	3.05	269.55	140.9	.991	139.7	.11400	13.13
.1905	16.40	4.00	269.10	161.7	.986	159.3	.05067	13.50
.2540	16.80	4.60	268.70	173.1	.983	170.0	.01267	13.83
.3175	17.10	5.00	268.40	180.8	.979	177.0	.00000	14.08
.3810	17.30	5.30	268.20	186.00	.975	181.3	.01267	14.25
.4445	17.30	5.30	268.20	186.0	.970	180.5	.05067	14.25
.5080	17.25	4.90	268.25	179.0	.965	172.7	.11400	14.20
.5715	17.10	4.15	268.40	164.6	.961	158.1	.20268	14.08
.6350	16.80	3.10	268.70	142.3	.957	136.1	.31669	13.83

RUN D

DERIVED DATA

VERTICAL DIAMETER-POINT 6-TEMP.PIPE 313.0 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	16.90	1.90	268.60	123.2	1.000	113.2	.31669	13.90
.0635	18.10	3.30	267.40	149.7	.994	148.8	.20268	14.90
.1270	18.55	4.20	266.95	169.1	.991	167.8	.11400	15.26
.1905	18.75	4.55	266.75	176.2	.986	173.9	.05067	15.42
.2540	18.95	4.70	266.55	179.0	.983	176.0	.01267	15.60
.3175	19.05	4.80	266.45	180.8	.979	177.0	.00000	15.70
.3810	19.05	4.80	266.45	180.8	.975	176.2	.01267	15.70
.4445	19.00	4.80	266.50	180.8	.970	175.3	.05067	15.63
.5080	18.90	4.75	266.60	179.8	.965	173.5	.11400	15.55
.5715	18.70	4.55	266.80	176.1	.961	169.3	.20267	15.40
.6350	18.50	4.20	267.00	169.0	.957	161.6	.31669	15.22

HORIZONTAL DIAMETER-POINT 6-TEMP.PIPE 313.0 C Abs.

.0000	16.40	1.60	269.10	103.8	1.000	103.8	.31669	13.50
.0635	17.35	3.40	268.15	151.9	.994	150.9	.20268	14.30
.1270	18.05	4.15	267.45	167.9	.991	166.3	.11400	14.86
.1905	18.40	4.25	267.10	170.0	.986	167.7	.05067	15.15
.2540	18.45	4.20	267.05	168.0	.983	166.0	.01267	15.20
.3175	18.30	3.90	267.20	162.8	.979	159.4	.00000	15.07
.3810	18.00	3.56	267.50	157.5	.975	153.6	.01267	14.82
.4445	17.90	3.65	267.60	157.5	.970	152.9	.05067	14.73
.5080	18.00	3.77	267.50	160.00	.965	154.4	.11400	14.82
.5715	18.30	3.90	267.20	162.8	.961	156.3	.20268	15.08
.6350	18.80	4.15	266.70	168.0	.957	160.7	.31669	15.48

45 DEGREE DIAMETER-POINT 6-TEMP.PIPE 313.0 C Abs.

.0000	17.60	2.00	267.90	116.3	1.000	116.3	.31669	14.50
.0635	18.40	3.40	267.10	151.9	.994	150.9	.20268	15.15
.1270	18.75	4.20	266.75	169.1	.991	167.7	.11400	15.43
.1905	18.85	4.55	266.65	176.2	.986	174.0	.05067	15.52
.2504	18.85	4.65	266.65	178.0	.983	175.0	.01267	15.52
.3175	18.82	4.70	266.68	179.0	.979	175.1	.00000	15.50
.3810	18.80	4.65	266.70	178.0	.975	173.5	.01267	15.48
.4445	18.70	4.60	266.80	177.0	.970	171.8	.05067	15.40
.5080	18.50	4.50	267.00	174.9	.965	168.7	.11400	15.22
.5715	18.25	4.30	267.25	171.0	.961	164.2	.20268	15.02
.6350	18.00	4.00	267.50	164.7	.957	157.5	.31669	14.82

RUN D

DERIVED DATA

45 DEGREE DIAMETER-POINT 6-TEMP.PIPE 313.0 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	16.60	1.50	268.90	95.8	1.000	95.8	.31669	13.68
.0635	18.10	3.40	267.40	152.0	.994	151.0	.20268	14.90
.1270	18.80	4.40	266.70	173.2	.991	171.8	.11400	15.48
.1905	18.90	4.75	266.60	179.8	.986	177.0	.05067	15.56
.2540	18.75	4.70	266.75	179.0	.983	176.0	.01267	15.42
.3175	18.60	4.60	266.90	176.9	.979	173.0	.00000	15.31
.3810	18.55	4.55	266.95	175.8	.975	171.3	.01267	15.28
.4445	18.60	4.60	266.90	176.9	.970	171.5	.05067	15.30
.5080	18.70	4.70	266.80	178.9	.965	172.5	.11400	15.40
.5715	18.90	4.85	266.60	181.70	.961	174.6	.20268	15.56
.6350	19.10	5.00	266.40	184.7	.957	176.6	.31669	15.72

VERTICAL DIAMETER-POINT 7-TEMP.PIPE 311.0 C Abs.

.0000	18.40	1.15	267.10	88.3	1.000	88.3	.31669	15.15
.0635	19.15	2.75	266.35	137.0	.994	136.0	.20268	15.78
.1270	19.50	3.70	266.00	158.9	.991	157.3	.11400	16.06
.1905	19.75	4.20	265.75	169.4	.986	167.0	.05067	16.26
.2540	19.90	4.47	265.60	174.7	.983	171.8	.01267	16.40
.3175	19.92	4.60	265.58	177.3	.979	173.6	.00000	16.40
.3810	19.95	4.70	265.55	179.2	.975	175.0	.01267	16.43
.4445	19.00	4.60	266.50	177.3	.970	172.0	.05067	15.64
.5080	19.00	4.35	266.50	172.0	.965	166.0	.11400	15.64
.5715	19.15	3.80	266.35	161.2	.961	155.0	.20268	15.77
.6350	19.55	3.00	265.95	143.3	.957	137.2	.31669	16.10

HORIZONTAL DIAMETER-POINT 7-TEMP.PIPE 311.0 C Abs.

.0000	19.00	1.70	266.50	107.0	1.000	107.0	.31669	15.64
.0635	19.45	2.55	266.05	131.2	.994	130.5	.20268	16.00
.1270	19.70	3.30	265.80	149.3	.991	148.0	.11400	16.20
.1905	19.90	3.90	265.60	162.5	.986	160.2	.05067	16.40
.2540	19.95	4.40	265.55	172.7	.983	169.7	.01267	16.43
.3175	20.00	4.60	265.50	176.3	.979	172.7	.00000	16.46
.3810	20.00	4.50	265.50	174.7	.975	170.2	.01267	16.46
.4445	19.95	4.25	265.55	169.5	.970	164.3	.05067	16.43
.5080	19.00	3.85	265.50	161.7	.965	156.0	.11400	15.64
.5715	19.95	3.30	265.55	149.7	.961	144.0	.20268	16.43
.6350	20.30	2.70	265.20	135.3	.957	129.5	.31669	16.70

RUN D

DERIVED DATA

45 DEGREE DIAMETER-POINT 7-TEMP.PIPE 311.0 C Abs.

Diam. Feet	h_p	h_v	$285.5-h_p$	V	Corr, Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	19.90	1.40	265.60	97.2	1.000	97.2	.31669	16.40
.0635	20.30	3.10	265.20	145.0	.994	144.1	.20268	16.70
.1270	20.65	4.20	264.85	168.8	.991	167.2	.11400	17.00
.1905	20.90	4.75	264.60	179.7	.986	177.0	.05067	17.20
.2540	21.05	5.10	264.45	186.2	.983	183.0	.01267	17.32
.3175	21.10	5.30	264.40	189.7	.979	185.8	.00000	17.37
.3810	21.10	5.20	264.40	188.1	.975	183.6	.01267	17.37
.4445	21.00	4.95	264.50	183.2	.970	177.8	.05067	17.30
.5080	20.95	4.60	264.55	177.0	.965	171.0	.11400	17.23
.5715	21.00	4.10	264.50	167.0	.961	160.5	.20268	17.30
.6350	21.00	3.20	264.50	147.6	.957	141.0	.31669	17.30

45 DEGREE DIAMETER-POINT 7-TEMP.PIPE 311.0 C Abs.

.0000	18.80	1.20	266.70	89.8	1.000	89.9	.31669	15.48
.0635	19.20	2.45	266.30	128.5	.994	127.8	.20268	15.80
.1270	19.55	3.60	265.95	155.9	.991	154.3	.11400	16.10
.1905	19.85	4.30	265.65	170.7	.986	168.2	.05067	16.33
.2540	20.05	4.60	265.45	176.6	.983	173.6	.01267	16.50
.3175	20.10	4.75	265.40	179.3	.979	175.6	.00000	16.55
.3810	20.10	4.75	265.40	179.3	.975	175.0	.01267	16.55
.4445	20.10	4.60	265.40	176.5	.970	171.2	.05067	16.55
.5080	20.10	4.30	265.40	170.8	.965	165.0	.11400	16.55
.5715	20.05	3.90	265.45	162.5	.961	156.1	.20268	16.50
.6350	20.05	3.20	265.45	147.4	.957	141.0	.31669	16.50

VERTICAL DIAMETER-POINT 8-TEMP.PIPE 311.0 C Abs.

.0000	23.90	1.80	261.60	111.1	1.000	111.1	.31669	19.67
.0635	25.10	4.10	260.40	168.3	.994	167.2	.20268	20.65
.1270	26.10	5.80	259.40	200.6	.991	199.0	.11400	21.48
.1905	26.55	7.00	258.95	220.2	.986	217.0	.05067	21.81
.2540	26.60	8.00	258.90	235.6	.983	231.3	.01267	21.90
.3175	26.40	8.60	259.10	244.1	.979	239.0	.00000	21.75
.3810	26.05	8.60	259.45	244.0	.975	238.0	.01267	21.45
.4445	26.00	7.90	259.50	233.5	.970	226.3	.05067	21.40
.5080	26.10	7.20	259.40	223.6	.965	215.5	.11400	21.48
.5715	26.30	6.20	259.20	207.2	.961	199.0	.20268	21.65
~~XXXXXXXXXX~~								
.6350	26.55	4.70	258.95	181.4	.957	173.6	.31669	21.85

RUN D

DERIVED DATA

HORIZONTAL DIAMETER-POINT 8-TEMP.PIPE 311.0 C Abs.

Diam. Feet	h_p	h_v	285.5-h_p	V	Corr. Fact.	Corr. V	Area Sq.Ft.	Vac.Oz. .823 h_p
.0000	23.15	1.00	262.35	82.6	1.000	82.6	.31669	19.15
.0635	23.90	3.05	261.60	145.0	.994	144.0	.20268	19.67
.1270	24.25	4.50	261.25	176.0	.991	174.3	.11400	19.96
.1905	24.30	5.20	261.20	189.3	.986	186.8	.05067	20.00
.2540	24.30	5.65	261.20	197.0	.983	193.6	.01267	20.00
.3175	24.30	5.75	261.20	199.0	.979	195.0	.00000	20.00
.3810	24.35	5.70	261.15	198.5	.975	193.6	.01267	20.03
.4445	24.40	5.35	261.10	192.0	.970	186.2	.05067	20.10
.5080	24.45	4.90	261.05	183.8	.965	177.2	.11400	20.13
.5715	24.55	4.30	260.95	172.20	.961	165.5	.20268	20.20
.6350	24.70	3.60	260.80	157.5	.957	150.6	.31669	20.33

45 DEGREE DIAMETER-POINT 8-TEMP.PIPE 311.0 C Abs.

.0000	24.10	2.00	261.40	117.2	1.000	117.2	.31669	19.82
.0635	25.40	4.20	260.10	170.5	.994	169.5	.20268	20.90
.1270	26.10	6.00	259.40	204.0	.991	200.0	.11400	21.48
.1905	26.50	7.40	259.00	226.8	.986	224.0	.05067	21.80
.2540	26.70	8.10	258.80	237.2	.983	233.0	.01267	22.00
.3175	26.80	8.30	258.70	240.2	.979	235.0	.00000	22.05
.3810	26.80	8.25	258.70	239.4	.975	233.5	.01267	22.05
.4445	26.65	7.70	258.85	231.4	.970	224.2	.05067	21.95
.5080	26.50	6.90	259.00	219.0	.965	221.3	.11400	21.80
.5715	26.30	5.90	259.20	202.60	.961	194.6	.20268	21.62
.6350	26.05	4.80	259.45	182.3	.957	174.3	.31669	21.42

45 DEGREE DIAMETER-POINT 8-TEMP.PIPE 311.0 C Abs.

.0000	22.70	1.00	262.80	82.6	1.000	82.6	.31669	18.69
.0635	23.60	3.00	261.90	143.5	.994	142.7	.20268	19.42
.1270	24.10	4.25	261.40	171.0	.991	169.4	.11400	19.83
.1905	24.30	4.95	261.20	184.7	.986	182.0	.05067	20.00
.2540	24.45	5.50	261.05	194.6	.983	191.2	.01267	20.12
.3175	24.50	5.75	261.00	199.0	.979	194.8	.00000	20.18
.3810	24.50	5.65	261.00	197.2	.975	192.2	.01267	20.18
.4445	24.40	5.30	261.10	191.3	.970	185.6	.05067	20.08
.5080	24.35	4.70	260.15	180.3	.965	174.0	.11400	20.03
.5715	24.45	4.00	261.05	165.8	.961	159.2	.20268	20.13
.6350	24.70	3.15	260.80	147.5	.957	141.0	.31669	20.33

RUN D

SUMMARY 8" PIPE DATA

Data for "Vacuum-Distance" and "Velocity-Distance" Curves.

Distance Feet from Inlet	Point No.	M.E.P. Values for the different diameters.				Average of M.E.P. Val.
		(Horizontal Run)				
6'- 7"	1	6.93	7.35	6.90		7.06
27'- 2 1/2"	2	8.03	8.06	7.96		8.02
52'- 9 1/2"	3	9.65	10.60	9.15		9.80
86'- 4"	4	12.05	11.84	12.00		11.96
117'- 1 1/2"	5	14.00	13.60	13.92		13.84
Feet from Elbow base Vert. Riser		(Vert. Run)				
10'- 0 7/8"	6	14.80	15.25	15.25	15.23	15.13
28'-10 1/8"	7	16.25	15.85	17.12	16.25	16.37
69'- 9"	8	19.94	21.34	19.87	21.42	20.64

Distance Feet from Inlet	Point No.	M.E.V. Values for the different diameters.				Average of M.E.V. Val.
		(Horizontal Run)				
6'- 7"	1	154.	168.	152.		158.
27'-2 1/2"	2	154.	152.	150.		152.
52'- 9 1/2"	3	157.	166.	148.		157.
86'- 4"	4	161.	155.	160.		159.
117'- 1 1/2"	5	162.	144.	153.		153.
Feet from Elbow base Vert. Riser		(Vert. Run)				
10'- 0 7/8"	6	154.	163.	166.	162.	161.
28'-10 1/8"	7	146.	152.	159.	151.	152.
69'- 9"	8	164.	195.	161.	195.	179.

[illegible]

[illegible] "[illegible]-Lifts" [illegible]

Distance Feet from Pilot	Points [illegible]	[illegible] Difference [illegible]	[illegible]
	(Boston [illegible])		
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Feet from Alpha Base New York Fleet	(Form. [illegible])		
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Distance Feet from Pilot	Points [illegible]	[illegible] Difference [illegible]	[illegible]
	(Philadelphia [illegible])		
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
Feet from Alpha Base New York Fleet	(Form. [illegible])		
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

RUN C

SUMMARY 8" PIPE DATA

Data for "Vacuum-Distance" and "Velocity-Distance" Curves.

Distance Feet from Inlet	Point No.	M.E.P. Values for the different diameters.				Average of M.E.P. Val.
		(Horizontal Run)				
25'- 3"	5	7.76	7.95	7.62		7.78
Feet from Elbow base Vert. Riser		(Vert. Run)				
10'- 0 7/8"	6	8.70	8.92	8.87	8.30	8.70
28'-10 1/8"	7	9.82	9.73	9.58	10.26	9.84
69'- 9"	8	12.90	12.90	13.93	14.08	13.45

Distance Feet from Inlet	Point No.	M.E.V. Values for the different diameters.				Average of M.E.V. Val.
		(Horizontal Run)				
25'- 3"	5	158.	161.	156.		158.
Feet from Elbow base Vert. Riser		(Vert. Run)				
10'- 0 7/8"	6	150.	159.	155.	141.	151.
28'-10 1/8"	7	137.	141.	135.	147.	140.
69'- 9"	8	155.	153.	178.	182.	167.

TABLE [illegible]

"[illegible]" [illegible]

Distance Feet from Inlet	Point No.	[illegible] Values for the different diameters.			Average of [illegible]
		(Horizontal [illegible])			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Feet from Blow Hose Vert. Floor		(Vert. [illegible])			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Distance Feet from Inlet	Point No.	[illegible] values for the different diameters.			Average of [illegible]
		(Horizontal [illegible])			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Feet from Blow Hose Vert. Floor		(Vert. [illegible])			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

RUN B

SUMMARY 8" PIPE DATA

Data for "Vacuum-Distance" and "Velocity-Distance" Curves.

Distance Feet from Inlet	Point No.	M.E.P. Values for the different diameters.				Average of M.E.P. Val.
		(Horizontal Run)				
12'- 6 1/2"	3	5.94	5.96	5.54		5.81
46'- 6"	4	8.35	7.28	8.00		7.88
76'-10 1/2"	5	9.64	9.93	10.13		9.90
Feet from Elbow base Vert. Riser		(Vertical Run)				
10'- 0 7/8"	6	10.38	11.00	10.74	10.76	10.72
28'-10 1/8"	7	12.24	12.32	12.08	12.62	12.32
68'- 9"	8	14.93	15.91	14.78	15.93	15.39

Distance Feet from Inlet	POINT No.	M.E.V. Values for the different diameters.				Average of M.E.V. Val.
		(Horizontal Run)				
12'- 6 1/2"	3	147.	144.	135.		142.
46'- 6"	4	153.	129.	154.		145.
76'-10 1/2"	5	142.	147.	151.		147.
Feet from Elbow base Vert. Riser		(Vertical Run)				
10'- 0 7/8"	6	135.	155.	141.	149.	145.
28'-10 1/8"	7	147.	144.	137.	150.	144.
69'- 9"	8	157.	178.	149.	179.	165.

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

RUN A

SUMMARY 8" PIPE DATA

Data for "Vacuum-Distance" and "Velocity-Distance" Curves.

Distance Feet from Inlet	Point No.	M.E.P. Values for the different diameters. (Horizontal Run)				Average of M.E.P. Val.
6'- 7 1/2"	1	5.90	6.23	6.05		6.06
27'- 2 1/2"	2	6.73	7.07	6.97		6.92
52'- 9 1/2"	3	9.98	9.53	9.88		9.80
86'- 4"	4	9.83	9.59	9.47		9.63
117'- 1 1/2"	5	11.32	11.31	11.16		11.26
Feet from Elbow base Vertical Riser		(Vertical Run)				
10'- 0 7/8"	6	11.30	12.12	11.93	12.06	11.85
28'-10 1/8"	7	13.60	13.27	13.40	13.40	13.42
69'- 9"	8	16.90	16.70	16.70	17.20	16.88

Distance Feet from Inlet	Point No.	M.E.V. Values for the different diameters. (Horizontal Run)				Average of M.E.V. Val.
6'- 7 1/2"	1	151.	156.	157.		155.
27'- 2 1/2"	2	148.	153.	143.		148.
52'- 9 1/2"	3	166.	167.	175.		169.
86'- 4"	4	152.	145.	143.		147.
117'- 1 1/2"	5	150.	150.	145.		148.
Feet from Elbow base Vert. Riser		(Vertical Run)				
10'- 0 7/8"	6	110.	135.	136.	136.	129.
28'-10 1/8"	7	147.	137.	140.	140.	141.
69'- 9"	8	157.	147.	148.	164.	154.

DETERMINATION OF CONSTANT "S",
for "Vacuum-Distance" formula.

$$S = \frac{83700 - \frac{P_2}{P_1}^2 \; 83700}{u_2^2 \; L}$$

P_2 = Absolute pressure at distance "L" from inlet or elbow.

P_1 = Absolute pressure at inlet or elbow.

u_2 = Velocity feet per second at P_2.

L = Distance feet from inlet or elbow of P_2.

(Note) See Peabody's Thermodynamics Page 383.

Values read from "Vacuum-Distance" and "Velocity-Distance" Curves.

RUN A

Horizontal Run				Horizontal Run.	Vertical Run.		
u_2	L	P_2	S	u_2	L	P_2	S
148	20	14.26	.001600	141	20	13.85	.003020
147	40	14.20	.001620	147	40	13.75	.002720
147	60	14.13	.001620	154	60	13.64	.002600
149	80	14.07	.001630			Average	.002780
151	100	14.00	.001620				
		Average	.001618				

RUN B

Horizontal Run				Vertical Run.			
143	20	14.31	.001960	144	10	14.03	.002230
145	40	14.23	.001670	145	30	13.94	.002430
146	60	14.16	.001950	151	50	13.84	.002270
148	80	14.069	.002120	166	70	13.74	.002012
		Average	.001925			Average	.002236

RUN C

Horizontal Run				Vertical Run			
				147	10	14.16	.002175
				144	30	14.06	.002636
				152	50	13.96	.002424
				167	70	13.86	.002059
						Average	.002323

RUN D

Horizontal Run				Vertical Run			
157	20	14.23	.001075	156	10	13.76	.001674
155	40	14.16	.001332	156	30	13.68	.001904
154	60	14.08	.001595	164	50	13.56	.002038
154	80	13.99	.001713	179	70	13.45	.001815
154	100	13.90	.001805			Average	.001858
153	120	13.81	.001912				
		Average	.001572				

[illegible]

[illegible]

$$[illegible] = \frac{[illegible] - \Sigma}{[illegible]}$$

[illegible]

[illegible] = [illegible] [illegible] [illegible]

RUN A

FIELD DATA

OPERATION OF BLOWER

HANDLING ASHES

Reading Time Sec.	R.P.M. Blower	R.P.M. Motor	Ounces Blower	Volts Motor	Amperes Motor
0	215	945	17.28	221	85
30	210	922	24.28	218	115
1:00	210	923	24.36	218	116
30	210	921	24.36	218	114
2:00	210	923	24.20	218	113
30	212	925	24.11	218	113
3:00	215	945	17.28	221	86

Length of run	2 min. 35 sec.
Weight ash handled	600 lbs.
Weight per cubic foot	40 lbs.
Point of feeding	Intake No.1.
Rate per minute (ash)	232 lbs.
Ounces vacuum at intake	5.00 oz.

[illegible]

RUN B

FIELD DATA

OPERATION OF BLOWER

HANDLING ASHES

Reading Time Sec.	R.P.M. Blower	R.P.M. Motor	Ounces Blower	Volts Motor	Amperes Motor
0	217	952	16.47	221	83
30	215	930	-----	218	114
1:000	210	930	24.30	218	115
30	210	930	24.30	218	117
2:00	213	930	24.40	218	118
30	217	952	16.47	218	82

Length of Run 2' 23"

Weight ash Handled 600#

Weight per cubic foot 40#

Point of feeding Intake #4

Rate per minute (ash) 251#

Ounces vacuum at intake 5 oz.

RUN C

FIELD DATA

OPERATION OF BLOWER

HANDLING ASHES

Reading Time Sec.	R.P.M. Blower	R.P.M. Motor	Ounces Blower	Volts Motor	Amperes Motor
0	220	970	14.40	226	76
30	220	960	-----	221	115
1:00	215	953	23.37	224	113
30	216	952	24.03	221	117
2:00	217	952	23.94	221	117
30	222	960	14.15	223	74

Length of run	1 min. 53 sec.
Weight ash handled	900 lbs.
Weight per cubic foot	40 lbs.
Point of feeding	Intake No. 8.
Rate per minute (ash)	305 lbs.
Ounces vacuum at intake	6.50 oz.

RUN A

FIELD DATA

OPERATION OF BLOWER

Reading Time Min.	R.P.M. Blower	R.P.M. Motor	Ounces: Blower	Volts Motor	Amperes Motor
0	217	955	18.00	221	89
10	217	955	18.00	217	88
10	217	955	18.00	217	89
15	217	955	18.00	217	88
20	217	955	18.00	216	88
25	217	955	18.00	216	88
30	217	955	18.00	216	88
35	217	955	18.00	217	88
40	217	955	18.00	217	88
45	217	955	18.00	217	88
50	217	955	18.00	216	88
55	217	955	18.00	216	88
60	220	965	18.00	221	90
1:05	222	970	18.00	222	90
10	222	970	18.00	222	90
15	221	960	18.00	222	90
20	220	960	18.00	221	89
25	220	960	18.00	221	90
30	220	960	18.00	221	90
35	219	960	18.00	221	89
40	215	945	17.00	216	87
45	215	945	17.00	216	87
50	215	945	17.00	216	87
55	215	945	17.00	217	87
60	215	945	17.00	217	87
2:05	215	945	17.00	216	87
10	216	945	17.00	216	87
15	215	945	17.00	216	87
20	215	945	17.00	216	87
25	215	945	17.00	217	87
30	215	945	17.00	216	87
35	215	945	17.00	216	87
40	215	945	17.00	217	86
45	215	945	17.00	217	86
50	215	945	17.00	217	86
55	215	940	17.00	219	81
60	215	935	17.00	219	81
3:05	215	940	17.00	219	81
10	215	940	17.00	219	82
15	216	945	17.00	221	83

[illegible]

RUN A

FIELD DATA

OPERATION OF BLOWER

Reading Time Min.	R.P.M. Blower	R.P.M. Motor	Ounces Blower	Volts Motor	Amperes Motor
3:20	217	950	17.50	221	83
25	217	950	17.50	220	83
30	217	950	17.50	221	83
35	217	950	17.50	220	83
40	220	955	17.50	222	83
45	220	960	17.50	2222	82
50	220	955	17.50	222	82
55	220	955	17.50	221	82
60	220	955	17.50	223	82
4:05	220	955	17.50	223	82
10	220	955	17.50	223	82
15	220	955	17.50	223	82
20	217	950	17.50	220	82
25	217	950	17.50	218	82
30	217	950	17.50	218	82
35	217	950	17.50	218	82
40	217	950	17.50	218	82
45	217	950	17.50	217	82
50	212	925	17.00	209	79
55	218	955	17.50	220	83
60	218	955	17.50	220	83
5:05	218	955	17.50	220	83
10	218	955	17.50	220	83
15	216	950	18.00	224	86
20	217	955	18.50	224	86
25	217	955	19.00	225	87
30	215	945	18.00	220	86
35	215	945	18.00	219	86
40	216	945	18.00	219	86
45	217	950	18.50	221	87
50	217	955	17.50	223	84
55	217	955	17.50	223	84
60	218	955	17.50	222	84
6:05	218	955	17.50	222	84
10	218	955	17.50	223	84

AVERAGE VALUES

217.10	951.30	17.60	219.20	85.30

[illegible]

[illegible]

[illegible]

[illegible] time [illegible]	[illegible] flow [illegible]	[illegible] color	[illegible] flower	[illegible] color	[illegible] color
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

RUN B

FIELD DATA

OPERATION OF BLOWER

Reading Time0Min.	R.P.M. Blower	R.P.M. Motor	Ounces Blower	Volts Motor	Amperes Motor
0	217	950	15.50	219	74
5	217	950	15.50	221	74
10	217	950	15.50	221	74
15	217	950	15.50	222	74
20	217	950	15.50	221	74
25	217	950	15.50	220	75
30	217	950	16.00	219	78
35	217	950	16.00	219	78
40	217	950	16.00	220	78
45	217	950	16.00	220	78
50	217	950	16.00	221	78
55	217	950	16.00	219	78
60	223	970	16.50	225	79
1:05	223	970	16.50	225	78
10	223	970	16.50	224	79
15	223	970	16.50	224	79
20	223	970	16.50	224	79
25	223	970	16.50	225	78
30	212	935	16.00	214	84
35	212	935	16.00	214	84
40	212	935	16.00	215	84
45	212	935	16.00	216	84
50	214	945	16.00	216	85
55	215	945	16.00	216	84
60	214	940	16.00	215	84
2:05	215	940	16.00	214	84
10	215	940	16.00	215	84
15	215	940	16.00	215	84
20	215	940	16.00	215	83
25	215	940	16.00	216	82
30	215	945	16.00	216	83
35	215	945	16.00	216	82
40	215	945	16.00	217	80
45	217	945	16.00	216	80
50	217	950	16.00	219	80
55	217	950	16.00	222	82
60	220	955	16.00	222	82
3:05	220	955	16.00	222	84
10	220	955	16.00	222	79
15	220	955	16.00	222	79
20	219	955	16.00	221	79
25	219	955	16.00	220	79
30	218	955	16.00	220	79
35	218	955	16.00	219	79
40	219	955	16.00	222	79

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

RUN C

FIELD DATA

OPERATION OF BLOWER

Reading Time Min.	R.P.M. Blower	R.P.M. Motor	Ounces Blower	Volts Motor	Amperes Motor
0	222	960	14.00	222	74
5	220	955	14.00	222	74
10	220	955	14.00	222	74
15	222	960	14.00	222	74
20	222	960	14.00	222	74
25	220	955	14.00	221	70
30	220	955	14.00	221	70
35	220	960	14.00	220	70
40	218	955	14.00	217	70
45	218	955	14.00	217	70
50	218	955	14.00	217	70
55	218	955	14.00	217	69
60	217	950	14.00	220	69
1:05	217	950	14.00	220	69
10	217	950	14.00	219	699
15	217	950	14.00	219	69
20	217	950	14.00	219	69
25	217	950	14.00	220	69
30	219	955	14.00	222	69
35	220	955	14.00	221	69
40	220	955	14.00	221	69
45	220	955	14.00	221	69
50	220	955	14.00	220	69
55	220	955	14.00	220	69
60	220	955	14.00	220	69
2:05	220	955	14.00	220	72
10	220	955	14.00	221	71
15	220	955	14.00	223	72
20	220	955	14.00	222	72
25	220	955	14.00	221	72
30	220	960	14.00	222	72

AVERAGE VALUES

	WQO.EP				
	219.30	955.00	14.00	220.30	70.60

RUN D

FIELD DATA

OPERATION OF BLOWER

Reading Time Min.	R.P.M. Blower	R.P.M. Motor	Ounces Blower	Volts Motor	Amperes Motor
0	240	1065	22.00	223	120
5	240	1065	22.00	224	120
10	240	1065	22.00	225	118
15	240	1060	22.00	223	118
20	240	1060	22.00	222	118
25	240	1060	22.00	222	118
30	240	1060	22.00	223	118
35	240	1060	22.00	223	118
40	240	1055	22.00	222	118
45	240	1055	22.00	222	118
50	240	1060	22.00	222	118
55	240	1060	22.00	223	118
60	240	1060	22.00	223	118
1:05	240	1060	22.00	224	118
10	240	1060	22.00	224	118
15	240	1060	22.00	220	122
20	240	1060	22.00	219	122
25	240	1060	22.00	219	122
30	240	1060	22.00	219	122
35	240	1060	22.00	220	122
40	240	1060	22.00	220	122
45	240	1060	22.00	220	122
50	240	1060	22.00	223	120
55	240	1060	22.00	222	120
60	240	1060	22.00	222	122
2:05	240	1060	22.00	222..	122
10	240	1060	22.00	222	122
15	240	1060	22.00	222	120
20	240	1060	22.00	221	120
25	240	1060	22.00	221	120
30	240	1060	22.00	221	120
35	240	1060	22.00	221	118
40	242	1070	21.00	222	111
45	242	1070	21.00	221	111
50	242	1070	21.00	219	111
55	240	1050	21.00	219	109
60	240	1050	21.00	219	109
3:05	240	1060	21.00	219	109
10	240	1060	21.00	219	108
15	240	1060	21.00	218	108
20	240	1060	21.00	220	108

[illegible]

RUN D

FIELD DATA

OPERATION OF BLOWER

Reading Time Min.	R.P.M. Blower	R.P.M. Motor	Ounces Blower	Volts Motor	Amperes Motor
3:25	240	1060	21.00	218	112
30	240	1060	21.00	217	110
35	239	1050	21.00	216	109
40	238	1040	21.00	215	108
45	238	1045	21.00	216	108
50	238	1040	21.00	217	108
55	245	1080	21.00	217	115
60	243	1070	21.00	217	112
4:05	245	1075	21.00	219	112
10	245	1070	21.00	218	111
15	243	1060	21.00	217	109
20	241	1060	21.00	218	108
25	245	1060	21.00	218	109

AVERAGE VALUES

240.50	1060.50	21.63	220.40	115.70

Resolution of forces acting on impellers of exhauster due to difference in air pressure between discharge and suction sides of exhauster. (See cross section of exhauster for manner of taking projected areas and radii or moment-arms.

Position No.	Resultant proj.area with force parallel to axis A-B	Moment Arm.	Moment	Resultant proj.area with force perpen'l to axis A-B	Moment Arm.	Moment	Resultant Moment.
			IMPELLER NO-1. ATMOSPHERE SIDE				
	Positive Moments			Negative Moments			Negative
0	4.375	3.063	13.375	3.875	11.687	45.25	34.375
1	4.875	3.312	16.125	5.625	10.813	60.88	44.750
2	4.812	3.282	15.760	6.937	10.157	70.50	54.712
3	4.620	3.187	14.750	7.875	9.688	76.25	61.500
4	4.500	3.125	14.050	8.313	9.469	78.75	64.700
5	4.500	3.125	14.050	8.313	9.469	78.75	64.700
6	4.500	3.125	14.050	8.313	9.469	78.75	64.700
7	4.250	3.000	12.750	8.437	9.407	79.50	66.750
8	4.250	3.000	12.750	8.375	9.438	79.00	66.250
9	5.375	2.687	14.450	8.250	9.500	78.32	63.875
10	4.500	3.125	14.050	8.250	9.500	78.32	64.275
11	4.500	3.125	14.050	8.250	9.500	78.32	64.275
12	4.500	3.125	14.050	8.250	9.500	78.32	64.275
13	4.500	3.125	14.050	8.375	9.438	79.00	64.950
14	4.500	3.125	14.050	8.375	9.438	79.00	64.950
15	4.630	3.188	14.750	7.750	9.750	75.62	60.875
16	4.875	3.313	16.125	6.750	10.250	69.15	53.025
17	4.812	3.282	15.790	5.375	10.938	58.82	43.038
			VACUUM SIDE				
	Negative Moments			Positive Moments			Positive
0	4.313	3.032	13.075	3.875	11.687	45.25	32.175
1	4.875	3.313	16.125	5.250	11.000	57.75	41.625
2	4.812	3.282	15.790	6.625	10.313	68.30	52.512
3	4.325	3.188	14.750	7.875	9.687	76.50	61.500
4	4.500	3.125	14.050	8.375	9.437	79.00	64.950
5	4.500	3.125	14.050	8.375	9.437	79.00	64.950
6	4.500	3.125	14.050	8.375	9.437	79.00	64.950
7	4.250	3.000	12.750	8.375	9.437	79.00	66.250
8	4.500	3.125	14.050	8.375	9.437	79.00	64.950
9	5.375	2.687	14.450	8.250	9.500	78.32	63.870
10	4.250	3.000	12.750	8.500	9.375	79.67	66.920
11	4.250	3.000	12.750	8.500	9.375	79.67	66.920
12	4.500	3.125	14.050	8.375	9.437	79.00	64.950
13	4.500	3.125	14.050	8.375	9.437	79.00	64.950
14	4.500	3.125	14.050	8.375	9.437	79.00	64.950
15	4.625	3.187	14.750	7.750	9.750	75.62	60.870
16	4.813	3.282	15.790	6.938	10.150	70.50	54.710
17	4.813	3.282	15.790	5.625	10.812	60.88	45.090

RUN A

FIELD DATA

18" AIR PIPE

Zero Reading Diam. Feet	Horz.Diam. Static Head Hg.	Horz.Diam. Vel. Head Water	Vert.Diam. Static Head Hg.	Vert.Diam. Vel. Head Water	45deg.Diam. Static Head Hg.	45deg.Diam. Vel. Head Water	45deg.Diam. Static Head Hg.	45deg.Diam. Vel. Head Water
Zero Reading	1.0	.000	1.0	.020	1.0	-.010	1.0	-.01
.10	21.30	.130	22.05	.100	21.60	.140	22.20	.230
.20		.195		.155		.165		.210
.30		.245		.220		.195		.270
.40		.280		.255		.205		.305
.50		.310		.280		.195		.320
.60		.320		.310		.205		.315
.70	21.35	.310	22.20	.330	21.60	.240	22.20	.330
.80	21.80	.280	22.20	.335	21.35	.355	22.20	.290
.90		.285		.340		.350		.310
1.00		.285		.310		.345		.300
1.10		.265		.300		.320		.280
1.20		.220		.285		.295		.245
1.30		.180		.240		.270		.205
1.40	21.30	.175	21.50	.300	21.30	.500	21.60	.220
Average Static Head	20.67							

Temperature air in pipe 28.0 degrees C

PLATE ORIFICE

	Temp. Atmosphere	Ounces Vacuum Discharge Chamber	Temp. Throat Orifice
	28.25	17.50	26.20
	28.30	17.50	26.00
	28.60	17.50	27.00
	28.00	17.50	26.50
Average	28.29	17.50	26.43

Run 1

Field Data

Zero Reading Time. Test	Static Vel. Head Hg.	Static Vel. Head Water	Static Vel. Head Hg.	Static Vel. Head Water	Static Vel. Head Hg.	Static Vel. Head Water
.10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.20		[illegible]		[illegible]		[illegible]
.30		[illegible]		[illegible]		[illegible]
.40		[illegible]		[illegible]		[illegible]
.50		[illegible]		[illegible]		[illegible]
.60		[illegible]		[illegible]		[illegible]
.70	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.80	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.90		[illegible]		[illegible]		[illegible]
1.00		[illegible]		[illegible]		[illegible]
1.10		[illegible]		[illegible]		[illegible]
1.20		[illegible]		[illegible]		[illegible]
1.30		[illegible]		[illegible]		[illegible]
1.40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Average Static Head	[illegible]	Temperature air in pipe [illegible] Inches o				

Flow Meter

Temp. Degrees	Inches Venturi Diameter Meter	Lbs/min. Direct Weight
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
Average [illegible]	[illegible]	[illegible]

RUN B

FIELD DATA

18" AIR PIPE

Zero Reading Diam. Feet	1.0 -.01 Horz.Diam. Static Head Hg.	Vel. Head Water	1.0 -.01 Vert.Diam. Static Head Hg.	Vel. Head Water	1.0 -.013 45deg.Diam. Static Head Hg.	Vel. Head Water	1.0 -.015 45deg.Diam. Static Head Hg.	Vel. Head Water
.10	20.00	.165	19.80	.095	19.50	.130	19.50	.500
.20		.200		.180		.170		.210
.30		.250		.235		.215		.265
.40		.290		.270		.240		.310
.50		.315		.290		.265		.300
.60		.325		.305		.260		.340
.70	19.80	.350	19.80	.300	19.50	.285	19.50	.345
.80	19.60	.305	19.80	.370	19.80	.375	20.00	.310
.90		.280		.370		.352		.310
1.00		.285		.360		.345		.300
1.10		.275		.325		.325		.270
1.20		.247		.295		.275		.250
1.30		.195		.230		.250		.235
1.40	19.50	.145	19.80	.160	19.80	.330	19.80	.200
Average Static Head	18.72							

Temperature air in pipe 27.75 degrees C

PLATE ORIFICE

	Temp. Atmosphere	Ounces Vacuum Discharge Chamber	Temp. Throat Orifice
	27.60	15.75	26.50
	27.50	16.00	26.50
	27.75	15.75	27.00
Average	27.62	15.83	26.66

Area of orfice 33.53 sq. in.

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

RUN C

FIELD DATA

18" AIR PIPE

Diam Feet	Horz.Diam. Static Head Hg.	Horz.Diam. Vel. Head Water	Vert.Diam. Static Head Hg.	Vert.Diam. Vel. Head Water	45deg.Diam. Static Head Hg.	45deg.Diam. Vel. Head Water	45deg.Diam. Static Head Hg.	45deg.Diam. Vel. Head Water
.10	16.90	.245	17.05	.125	17.00	.180	17.05	.160
.20		.260		.180		.215		.210
.30		.300		.225		.255		.260
.40		.340		.260		.285		.280
.50		.360		.295		.310		.260
.60		.370		.315		.325		.300
.70	17.00	.370	17.00	.340	17.00	.350	16.90	.310
.80	17.00	.310	17.00	.400	16.90	.340	16.95	.320
.90		.305		.400		.335		.325
1.00		.295		.380		.355		.345
1.10		.285		.360		.320		.315
1.20		.230		.315		.295		.275
1.30		.185		.260		.265		.245
1.40	17.00	.150	17.00	.220	17.00	.350	17.00	.270
Average Static Head	16.98		Temperature air in pipe 28.00 degrees C					

PLATE ORIFICE

	Temp. Atmosphere	Ounces Vacuum Discharge Chamber	Temp. Throat Orifice
	27.50	14.00	26.50
	27.30	14.00	26.40
	27.50	14.00	26.80
Average	27.43	14.00	26.60

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

RUN D

FIELD DATA

18" AIR PIPE

-.02

Zero Reading Diam. Feet	Horz.Diam. Static Head Hg.	Horz.Diam. Vel. Head Water	Vert.Diam. Static Head Hg.	Vert.Diam. Vel. Head Water	45deg.Diam. Static Head Hg.	45deg.Diam. Vel. Head Water	45deg.Diam. Static Head Hg.	45deg.Diam. Vel. Head Water
.10	26.40	.350	26.40	.160	26.70	.390	26.40	.300
.20		.305		.235		.290		.315
.30		.385		.275		.290		.370
.40		.405		.320		.375		.400
.50		.415		.240		.380		.415
.60		.445		.185		.410		.430
.70	26.40	.420	26.20	.190	26.50	.405	26.40	.425
.80	26.40	.390	26.20	.330	26.50	.405	26.40	.365
.90		.400		.330		.430		.370
1.00		.335		.360		.425		.355
1.10		.335		.335		.395		.360
1.20		.290		.315		.335		.340
1.30		.245		.280		.310		.280
1.40	26.50	.230	26.50	.300	26.40	.500	26.40	.260

Average Static Head 26.425 Temperature air in pipe 28.00 degrees C

PLATE ORIFICE

	Temp. Atmosphere	Ounces Vacuum Discharge Chamber	Temp. Throat Orifice
	27.50	21.50	26.40
	27.30	21.50	26.00
Average	27.40	21.50	26.20

Area of orifice 30.19 sq. in.

RUN A

DERIVED DATA

18" AIR PIPE

h_p DIFF.MERCURY GAUGE = 20.67 TEMP.PIPE 301.0 C Abs.

Diam. Feet	h_v Horz. Diam. (Water)	Vel.	h_v Vert. Diam. (Water)	Vel.	h_v 45Deg. Diam. (Water)	Vel.	h_v 45Deg. Diam. (Water)	Vel.	Area Sq.Ft. / 4
0.10	.130	24.50	.080	19.20	.150	26.30	.155	26.70	.44200
0.20	.190	29.60	.135	25.00	.180	28.80	.220	31.80	.33200
0.30	.245	33.60	.200	30.20	.205	30.70	.280	35.90	.23800
0.40	.280	36.00	.235	32.90	.215	31.50	.315	38.10	.15900
0.50	.310	37.80	.260	34.60	.205	30.80	.330	39.00	.09630
0.60	.320	38.40	.290	36.60	.215	31.50	.325	38.70	.01770
0.70	.310	37.80	.310	37.80	.250	34.00	.325	38.70	.00197
0.80	.290	36.60	.345	39.90	.355	40.50	.325	38.70	.01770
0.90	.295	36.90	.350	40.10	.360	40.80	.320	38.40	.04910
1.00	.295	36.90	.320	38.40	.345	39.90	.310	37.80	.09630
1.10	.270	35.30	.310	37.80	.320	38.40	.290	36.60	.15900
1.20	.235	32.90	.290	36.60	.295	36.90	.255	34.30	.23800
1.30	.200	30.40	.255	34.30	.270	35.30	.215	31.50	.33200
1.40	.170	28.00	.215	31.50	.240	33.30	.170	28.00	.44200

RUN B

DERIVED DATA
1
18" AIR PIPE

h_p DIFF.MERCURY GAUGE = 18.72 TEMP.PIPE 300.75 C Abs.

Diam. Feet	h_v Horz. Diam. (Water)	Vel.	h_v Vert. Diam. (Water)	Vel.	h_v 45Deg. Diam. (Water)	Vel.	h_v 45Deg. Diam. (Water)	Vel.	Area $\frac{\text{Sq.Ft.}}{4}$
0.00	.145	25.75	.085	19.70	.100	21.40	.110	22.40	.44200
0.10	.175	28.25	.150	26.20	.140	25.30	.170	27.90	.33200
0.20	.210	31.00	.207	30.80	.180	28.70	.225	32.10	.23800
0.30	.260	34.45	.245	33.50	.225	32.10	.270	35.10	.15900
0.40	.300	37.00	.277	35.60	.250	33.80	.310	37.60	.09630
0.50	.325	38.50	.300	37.00	.275	35.50	.332	38.90	.04910
0.60	.335	39.10	.313	37.80	.277	35.60	.343	39.60	.01770
0.70	.332	39.00	.317	38.10	.298	36.90	.344	39.60	.00197
0.80	.320	38.20	.380	41.70	.340	39.40	.335	39.20	.00197
0.90	.305	37.30	.380	41.70	.360	40.60	.322	38.40	.01770
1.00	.295	36.75	.370	41.10	.355	40.30	.305	37.40	.04910
1.10	.285	36.10	.335	39.20	.335	39.20	.285	36.10	.09630
1.20	.253	34.00	.305	37.30	.287	36.20	.263	34.70	.15900
1.30	.306	37.40	.240	33.20	.260	34.50	.240	33.20	.23800
1.40	.152	30.70	.170	27.90	.240	33.10	.215	31.40	.33200
1.50	.095	20.84	.110	22.40	.225	32.10	.190	29.50	.44200

RUN C

DERIVED DATA

18" AIR PIPE

h_p DIFF.MERCURY GAUGE = 16.98 TEMP.PIPE 301.00 C Abs.

Diam. Feet	h_v Horz. Diam. (Water)	Vel.	h_v Vert. Diam. (Water)	Vel.	h_v 45Deg. Diam. (Water)	Vel.	h_v 45Deg. Diam. (Water)	Vel.	Area Sq.Ft. / 4
0.00	.200	30.20	.080	19.10	.150	26.10	.115	22.90	.44200
0.10	.242	33.20	.135	24.80	.190	29.40	.170	27.80	.33200
0.20	.283	35.90	.187	29.20	.225	32.00	.220	31.70	.23800
0.30	.320	38.20	.235	32.70	.262	34.50	.259	34.40	.15900
0.40	.350	39.90	.272	35.20	.293	36.50	.285	36.00	.09600
0.50	.370	40.90	.305	37.30	.320	38.20	.301	37.00	.04910
0.60	.380	41.60	.325	38.50	.340	39.40	.313	37.80	.01770
0.70	.377	41.50	.350	39.90	.351	40.00	.322	38.30	.00197
0.80	.360	40.50	.410	43.20	.357	40.30	.330	38.80	.00197
0.90	.335	39.00	.410	43.20	.356	40.25	.335	39.10	.01770
1.00	.305	37.30	.390	42.15	.346	39.70	.330	38.80	.04910
1.10	.275	35.40	.370	41.10	.328	38.60	.315	37.90	.09630
1.20	.236	32.80	.325	38.50	.303	37.20	.296	36.70	.15900
1.30	.197	30.00	.270	35.10	.275	35.40.	.266	34.80	.23800
1.40	.155	26.60	.230	32.40	.240	33.10	.228	32.20	.33200
1.50	.115	22.90	.195	29.80	.205	30.60	.183	28.90	.44200

[illegible]

[illegible]

[illegible]

[illegible]

Flow. Rate	Vel.	Flow. Rate (Water)	Vel.	Flow. Rate (Water)	Vel.	Flow. Rate (Water)	Vel.	Flow. Rate (Water)	Vel.	Cross Sec.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

RUN D

DERIVED DATA

18" AIR PIPE

h_p DIFF.MERCURY GAUGE = 26.43 TEMP.PIPE 301.00 C Abs.

Diam. Feet	h_v Horz. Diam. (Water)	Vel.	h_v Vert. Diam. (Water)	Vel.	h_v 45Deg. Diam. (Water)	Vel.	h_v 45Deg. Diam. (Water)	Vel.	Area Sq.Ft. / 4
0.00	.260	35.00	.160	27.50	.210	31.50	.239	33.60	1.76700
0.10	.307	38.10	.216	31.90	.255	34.70	.276	36.10	1.33000
0.20	.350	40.60	.253	34.60	.300	37.70	.311	38.30	.95100
0.30	.382	42.50	.285	36.70	.336	39.80	.340	40.10	.63600
0.40	.405	43.70	.310	38.20	.366	41.50	.365	41.50	.38500
0.50	.419	44.50	.329	39.40	.387	42.70	.385	42.60	.19650
0.60	.425	44.80	.345	40.30	.397	43.30	.401	43.50	.07070
0.70	.421	44.60	.355	40.90	.395	43.20	.415	44.30	.00786
0.80	.407	43.80	.355	40.90	.385	42.60	.422	44.60	.00786
0.90	.385	42.60	.353	40.80	.367	41.60	.422	44.60	.07070
1.00	.360	41.20	.345	40.30	.345	40.30	.415	44.30	.19650
1.10	.330	39.40	.333	39.60	.320	38.80	.395	43.20	.38500
1.20	.295	37.30	.317	38.70	.295	37.30	.360	41.20	.63600
1.30	.258	34.90	.297	37.40	.262	35.20	.315	38.60	.95100
1.40	.220	32.20	.275	36.00	.230	32.90	.267	35.30	1.33000
1.50	.182	29.20	.250	34.30	.194	30.20	.219	32.20	1.76700

[illegible]

DERIVED DATA

[illegible]

h_p DIAM. [illegible] = [illegible] DIAM. [illegible]

Diam. Foot	h_v Vol. Diam. (Meter)	Vol.	h_v Vol. Diam. (Meter)	Vol.	h_v Vol. Diam. (Meter)	Vol.	h_v Vol. Diam. (Meter)	Vol.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SUMMARY 18" PIPE DATA

Run	Average M.E.V.	Average M.E.P. oz.	Cu.Ft. air per min.	Oz. Vacuum Blower	Cu.Ft. air per min. Blower	Absolute temperat. air pipe deg. Cent.
A	31.58	17.00	3350.	17.60	3360	301.
B	32.54	15.41	3453.	16.00	3459	300.
C	33.54	13.99	3558.	14.00	3558	301.
D	37.40	21.75	3969.	21.63	3969	301.

SUMMARY BLOWER DATA
for use in determining "Leakage Curve".

Run	H.P. Input	R.P.M. Blower	Oz. Vacuum Blower (p)	Cu.Ft. air at (p)	Cu.Ft. Displ. per min.	Cu.Ft. Leakage	Theor. H.P.	Bearing friction H.P.
A	21.80	217.1	17.6	3360.	4125.	765.	19.46	2.34
B	20.59	217.3	16.0	3459.	4129.	670.	17.66	2.93
C	18.71	219.3	14.0	3558.	4167.	609.	15.59	3.12
D	30.55	240.5	21.63	3969.	4570.	601.	26.38	4.17

SUMMARY PLATE ORIFICE DATA

Run		A	B	C	D
Temp. Atmos. Deg. Cent.	T_1	301.29	300.62	300.43	301.40
Temp, Orifice throat Deg. Centigrade	T_3	299.43	299.67	299.57	299.20
Vacuum Orifice chamber #/sq."	P_3	13.61	13.71	13.83	13.36
Cu.Ft. passing per second 18"pipe	V_2	55.83	57.93	59.30	66.15
Cu.Ft.at atmos. per second.	V_1	51.82	53.97	55.68	60.11
Cu.Ft. Orifice chamber per sec.	V_3	55.62	57.65	59.04	65.65
H.P.disipated in orifice per sec.		13.91	13.48	12.42	20.04
Temp. air pipe Deg. Cent.	T_2	301.00	299.75	301.00	301.00
Energy loss per 1000 cu.ft. free air per min.	W	4.47	4.17	3.72	5.55
Atmosphere pressure lbs. per sq. in.	P_1	14.70	14.70	14.70	14.70

[illegible] I" [illegible]

Run	Average [illegible] F.A.M.	Average Cu.ft. air or. per min.	[illegible] Volume [illegible] flower per min.	Cu. ft. Temperature [illegible]	Absolute temperature air [illegible] deg. Cent.
A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
D	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SUMMARY [illegible] DATA
For use in determining "Balance Curve".

Run	[illegible] F.A.M.	Cu. ft.	Cu.ft.	Cu.ft.	Cu.ft.	Theor. [illegible]	Heating [illegible]
	Input [illegible]	Blower Vacuum air at [illegible]	Blower (p)	(q)	Blower [illegible]	[illegible] per min.	[illegible]
A	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
D	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] FLOW [illegible] DATA

Run	A	B	C	D
Temp. Atmos. Per. Cent.	[illegible]	[illegible]	[illegible]	[illegible]
Temp. Orifice Throat Deg. Centigrade	[illegible]	[illegible]	[illegible]	[illegible]
Vacuum orifice number "U" deg.	[illegible]	[illegible]	[illegible]	[illegible]
Cu.ft. passing per second 1 "pipe	[illegible]	[illegible]	[illegible]	[illegible]
Cu.ft. at atmos. per second.	[illegible]	[illegible]	[illegible]	[illegible]
Cu.ft. Orifice chamber per sec.	[illegible]	[illegible]	[illegible]	[illegible]
H.P. dissipated in orifice per sec.	[illegible]	[illegible]	[illegible]	[illegible]
Temp. air pipe Deg. Cent.	[illegible]	[illegible]	[illegible]	[illegible]
Energy lost per 1000 cu.ft. free air per min.	[illegible]	[illegible]	[illegible]	[illegible]
Atmosphere pressure lbs. per sq. in.	[illegible]	[illegible]	[illegible]	[illegible]

Power to drive a WILBRAHAM-GREEN POSITIVE EXHAUSTER of cross section same as their #5-19 cu.ft. exhauster against vacuum as indicated, and handling 4200 cu.ft. of FREE AIR per minute. Leakage determined from "LEAKAGE CURVE". Horse Power determined from formula as follows: (Friction neglected)

$$\frac{2\pi \times C \times R.P.M. \times l \times p}{33000} = H.P.$$

c = constant = 9.81
l = length of case in inches
p = vacuum below atmosphere in pounds

Oz. Vac. = (p)	Cu,Ft. Handled at (p)= (V)	Leakage Cu.Ft. per min. (L)	Cu.Ft.Displ. at (p) considering no leakage= $V_{100} = V + L$	R.P.M.	H.P.	True eff. $\frac{V}{V_{100}}$ %	Free Air eff. $\frac{4200}{V_{100}}$ %
Displacement 15 cu.ft. per minute. Length of case 33.6 inches							
12	4430	335	4765	318	15.00	93.0	88.0
16	4500	358	4858	324	20.40	92.5	86.4
20	4590	379	4969	331	26.00	92.4	84.5
Displacement 16 cu.ft. per minute. Length of case 35.8 inches							
12	4430	388	4818	301	15.10	92.0	87.2
16	4500	418	4918	307.	20.60	91.5	85.4
20	4590	442	5032	315	26.40	91.2	83.4
24	4680	446	5147	321	32.30	91.0	81.8
28	4765	486	5251	328	38.50	90.6	80.0
Displacement 17 cu.ft. per minute. Length of case 38.0 inches							
12	4430	444	4874	286	14.85	90.9	86.2
16	4500	478	4978	292	20.20	90.4	84.5
20	4590	509	5099	299	25.90	90.0	82.5
24	4680	555	5215	307	31.85	89.7	80.5
28	4765	560	5325	313	37.90	89.5	79.0
32	4860	581	5441	320	44.30	89.3	77.2
Displacement 18 cu.ft. per minute. Length of case 40.25 inches							
12	4430	498	4928	274	15.48	89.9	85.1
16	4500	539	5039	279	21.10	89.3	83.5
20	4590	573	5163	287	27.00	88.9	81.5
24	4680	605	5285	293	33.20	88.6	79.5
28	4765	636	5401	300	39.50	88.1	77.8

Oz. Vac. (p)	Cu.Ft. Handled at (p)= (V)	Leakage Cu.Ft. per min. (L)	Cu,Ft.Displ. at (p) cons idreing no leakage = V_{100}= V + L	R.P.M.	H.P.	True eff. $\frac{V}{V_{100}}$ %	FreeAir eff. $\frac{4200}{V_{100}}$ %
Displacement 19 cu.ft. per minute. Length of case 42.50 inches							
12	4430	555	4985	262	15.60	89.00	84.4
16	4500	599	5099	268	21.30	88.2	82.4
20	4590	638	5228	275	27.30	87.7	80.3
24	4680	675	5355	282	33.60	87.4	78.4
28	4765	712	5472	288	40.10	87.0	76.7
32	4860	742	5602	295	47.00	86.7	75.0
Displacement 20 cu.ft. per minute. Length of case 44.70 inches							
12	4430	609	5039	252	15.80	88.0	83.4
16	4500	658	5158	258	21.60	87.1	81.5
20	4590	704	5294	265	27.65	86.7	79.4
24	4680	746	5426	271	34.00	86.3	77.5
28	4765	786	5551	277	40.60	85.9	75.6
32	4860	820	5680	284	47.50	85.5	74.0
Displacement 21 cu.ft. per minute. Length of case 47.00 inches							
12	4430	665	5095	242	16.00	87.0	82.5
16	4500	719	5219	248	21.90	86.1	80.5
24	4680	815	5495	262	34.60	85.2	76.3
28	4765	861	5626	268	41.30	84.7	74.6
32	4860	900	5760	274	48.20	84.4	73.0
36	4960	938	5898	280	55.60	84.0	71.3
Displacement 22 cu.ft. per minute. Length of case 49.20 inches							
12	4430	720	5152	234	16.20	86.0	81.5
16	4500	780	5280	240	22.10	85.20	79.5
20	4590	835	5425	246	28.30	84.5	77.5
24	4680	889	5569	253	35.00	84.00	75.5
28	4765	937	5702	259	41.70	83.5	73.7
32	4860	981	5841	265	48.80	83.20	71.9
36	4960	1022	5982	272	56.40	83.00	70.2

Oz. Vac. = (p)	Cu.Ft. Handled at (p)= (V)	Leakage Cu.Ft. per min. (L)	Cu.Ft.Displ. at (p) considering no leakage = $V_{100} = V + L$	R.P.M.	H.P.	True eff. $\frac{V}{V_{100}}$ %	Free Air eff. $\frac{4200}{V_{100}}$ %
Displacement 23 cu.ft. per minute. Length of case 51.5 inches							
12	4430	775	5205	226	16.40	85.1	80.6
16	4500	840	5340	232	22.40	84.3	78.7
20	4590	900	5490	238	28.70	83.5	76.5
24	4680	960	5640	245	35.40	83.0	74.5
28	4765	1016	5781	251	42.30	82.5	72.7
32	4860	1060	5920	258	49.60	82.10	70.8
36	4960	1106	6066	264	57.20	81.8	69.2
Displacement 24 cu,ft. per minute. Length of case 53.7 inches							
12	4430	829	5259	219	16.50	84.2	80.0
16	4500	900	5400	225	22.60	83.3	77.8
20	4590	967	5557	231	29.05	82.5	75.7
24	4680	1030	5710	238	35.90	82.0	73.5
28	4765	1090	5855	244	42.90	81.4	71.7
32	4860	1142	6002	250	50.30	81.0	70.0
36	4960	1194	6154	256	57.90	80.5	68.3
Displacement 25 cu.ft. per minute. Length of case 55.9 inches							
12	4430	885	5315	212	16.65	83.4	79.1
16	4500	959	5459	218	22.85	82.3	77.0
20	4590	1030	5620	225	29.40	81.7	74.6
24	4680	1100	5780	231	36.20	81.0	72.7
28	4765	1167	5932	237	43.50	80.4	70.8
32	4860	1225	6085	243	50.90	80.0	69.0
36	4960	1280	6240	249	58.80	79.5	67.3

Displacement [illegible] cu.ft. per minute. Length of chord [illegible] inches

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

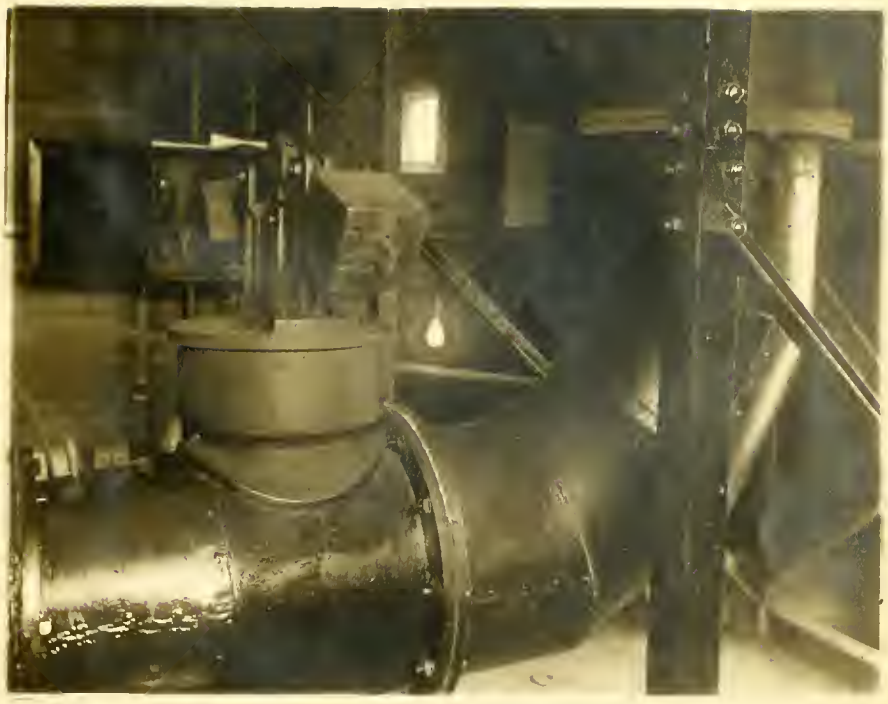
Displacement [illegible] cu.ft. per minute. Length of chord [illegible] inches

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Displacement [illegible] cu.ft. per minute. Length of chord [illegible] inches

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Three Way Spray Water Control and Blast Gate



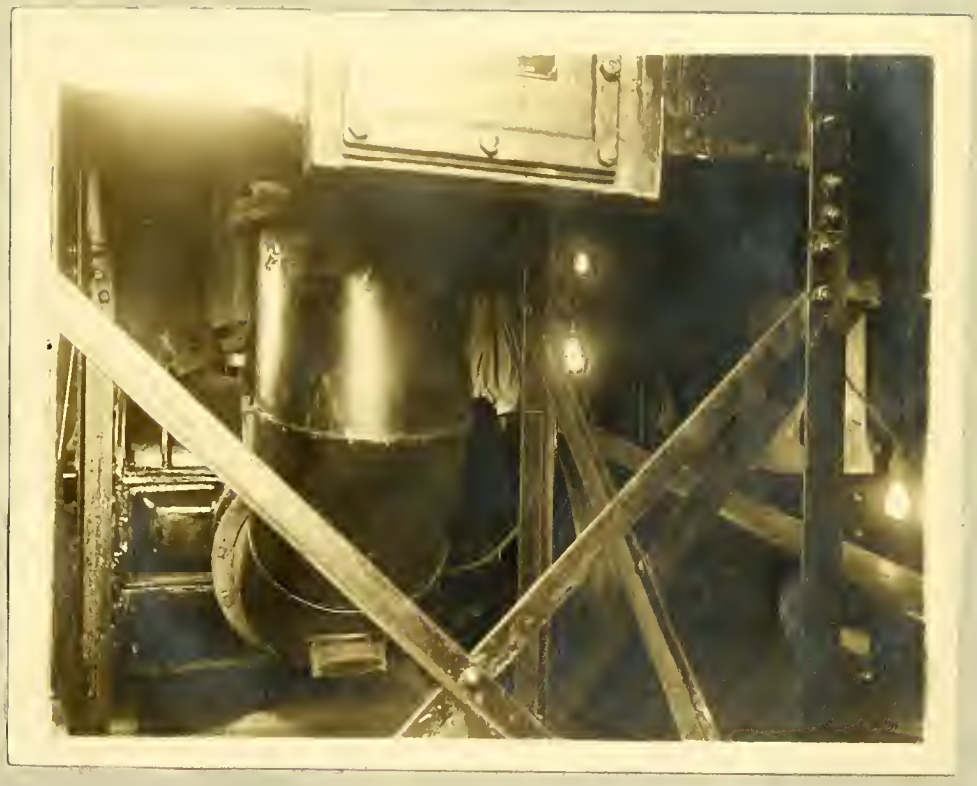
The Positive Relief Valve

18" Galvanized Air Pipe Connection to Storage tank and Discharge from Exhauster

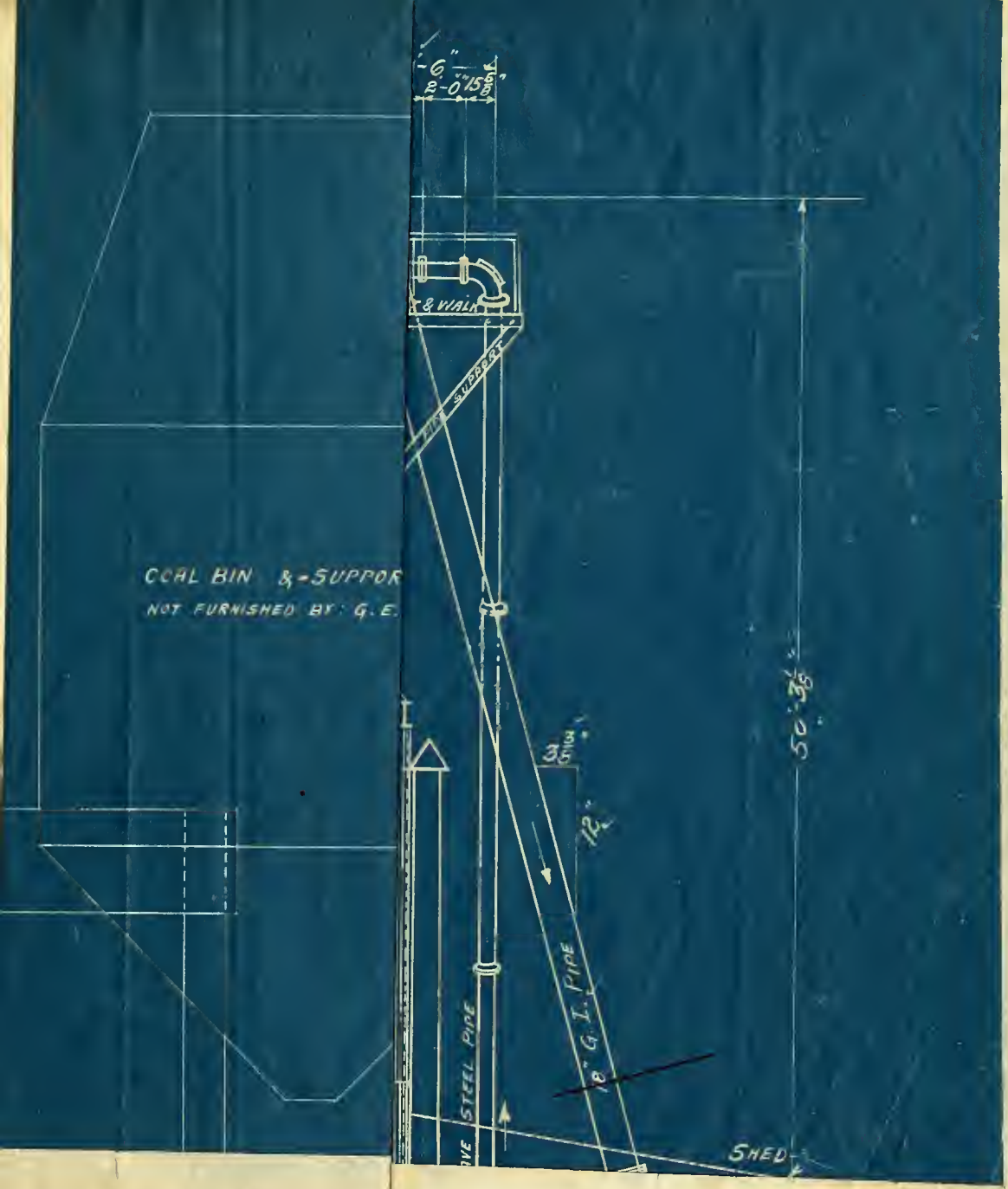
Connection of 8" Conveyor Pipe to Storage Tank

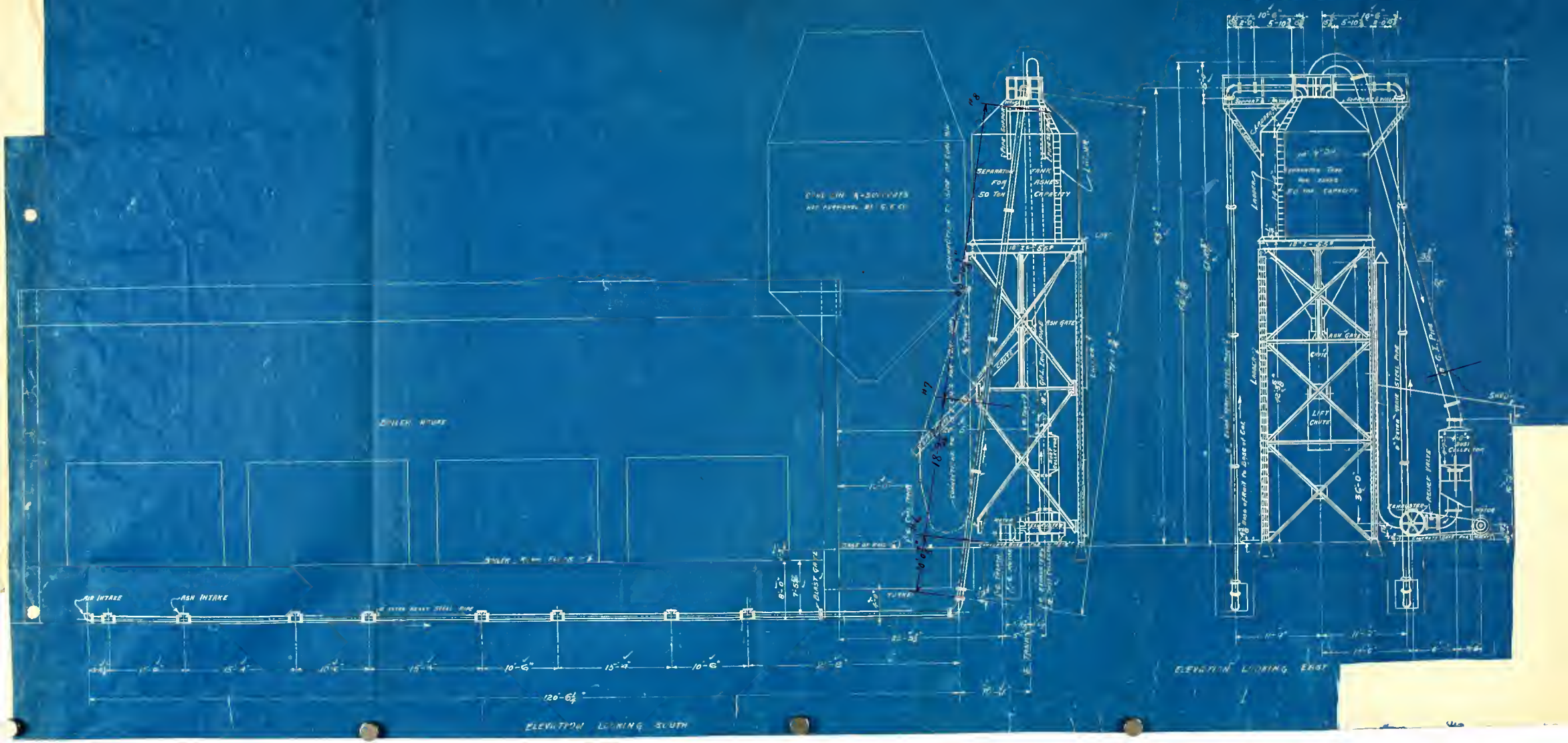
8 inch Conveyor Pipe & Hopper

Pitot Tube & Differential Draft Gauge

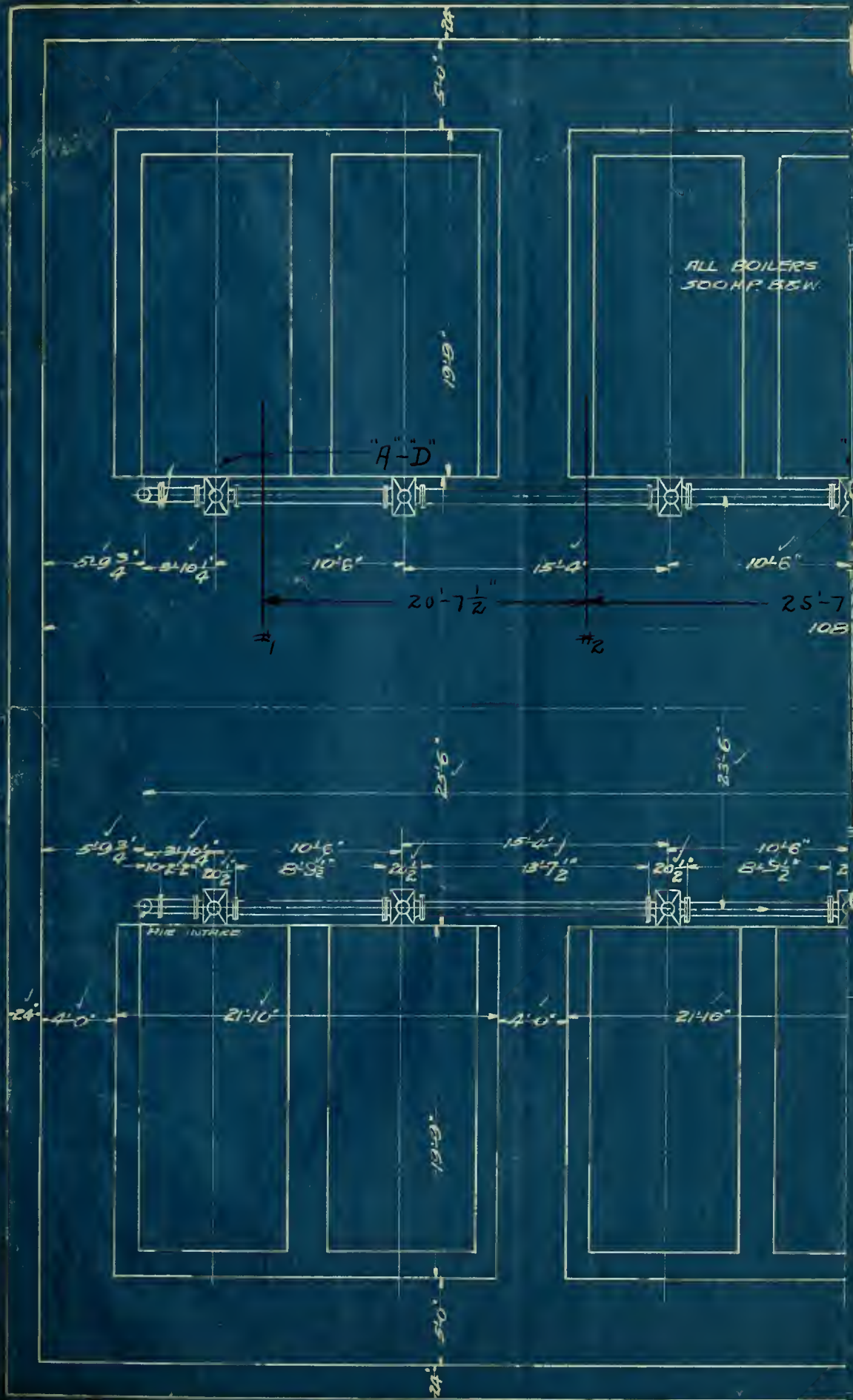


Belt Driven Exhauster

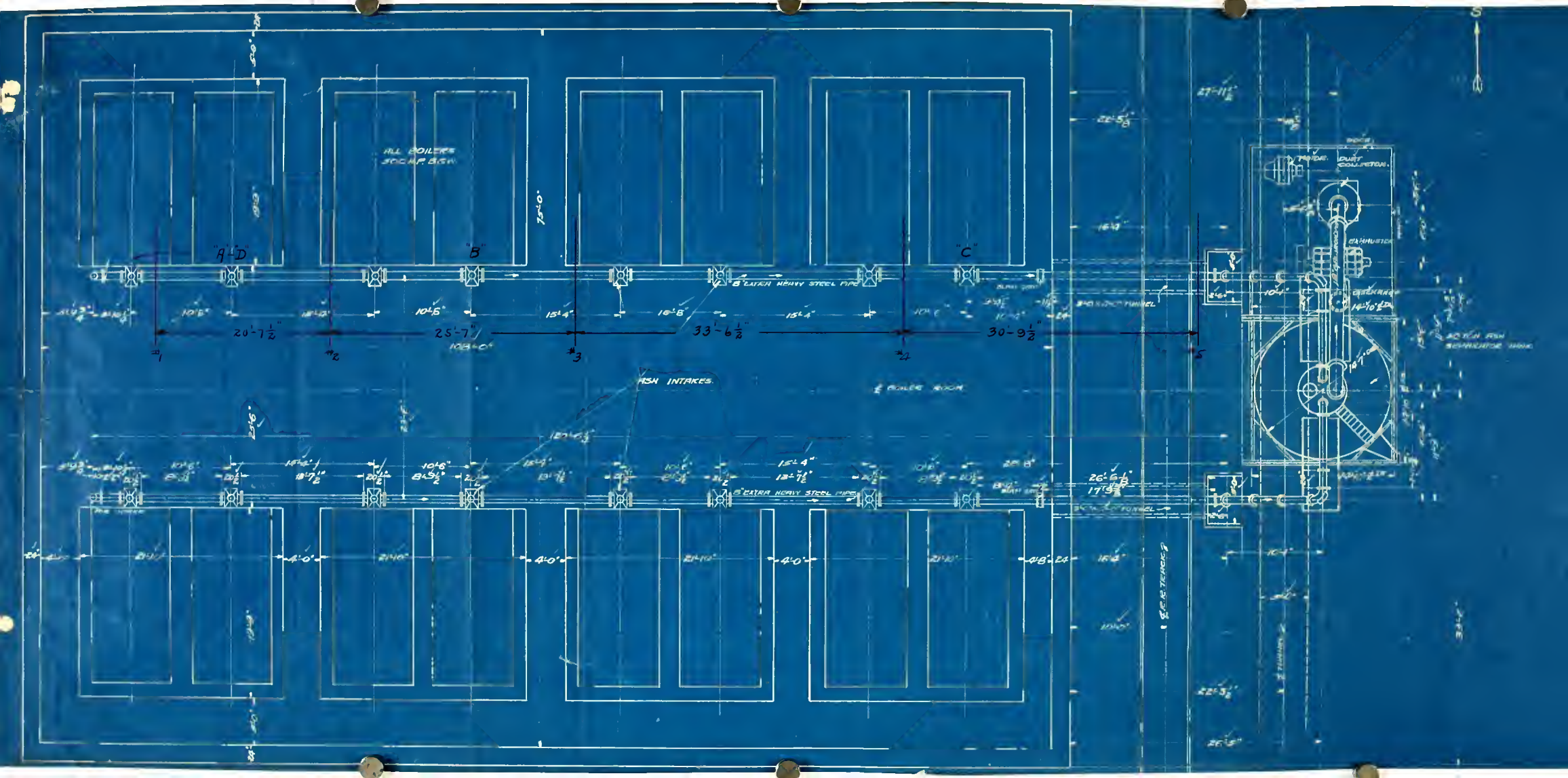

6"
2-0 15 5/8"
& WALL
SUPPORT
COAL BIN & SUPPOR
NOT FURNISHED BY G.E.
3 5/16"
12"
50' 3 5/8"
STEEL PIPE
8" G.I. PIPE
SHED


BOILER HOUSE
AIR INTAKE
ASH INTAKE
BLAST GATE
SEPARATOR TANK FOR ASHES 50 TON CAPACITY
ASH GATES
CHUTE
LIFT CHUTE
LADDER
RELIEF HOUSE
DUST COLLECTOR
MOTOR
ELEVATION LOOKING SOUTH
ELEVATION LOOKING EAST

[illegible]
[illegible]

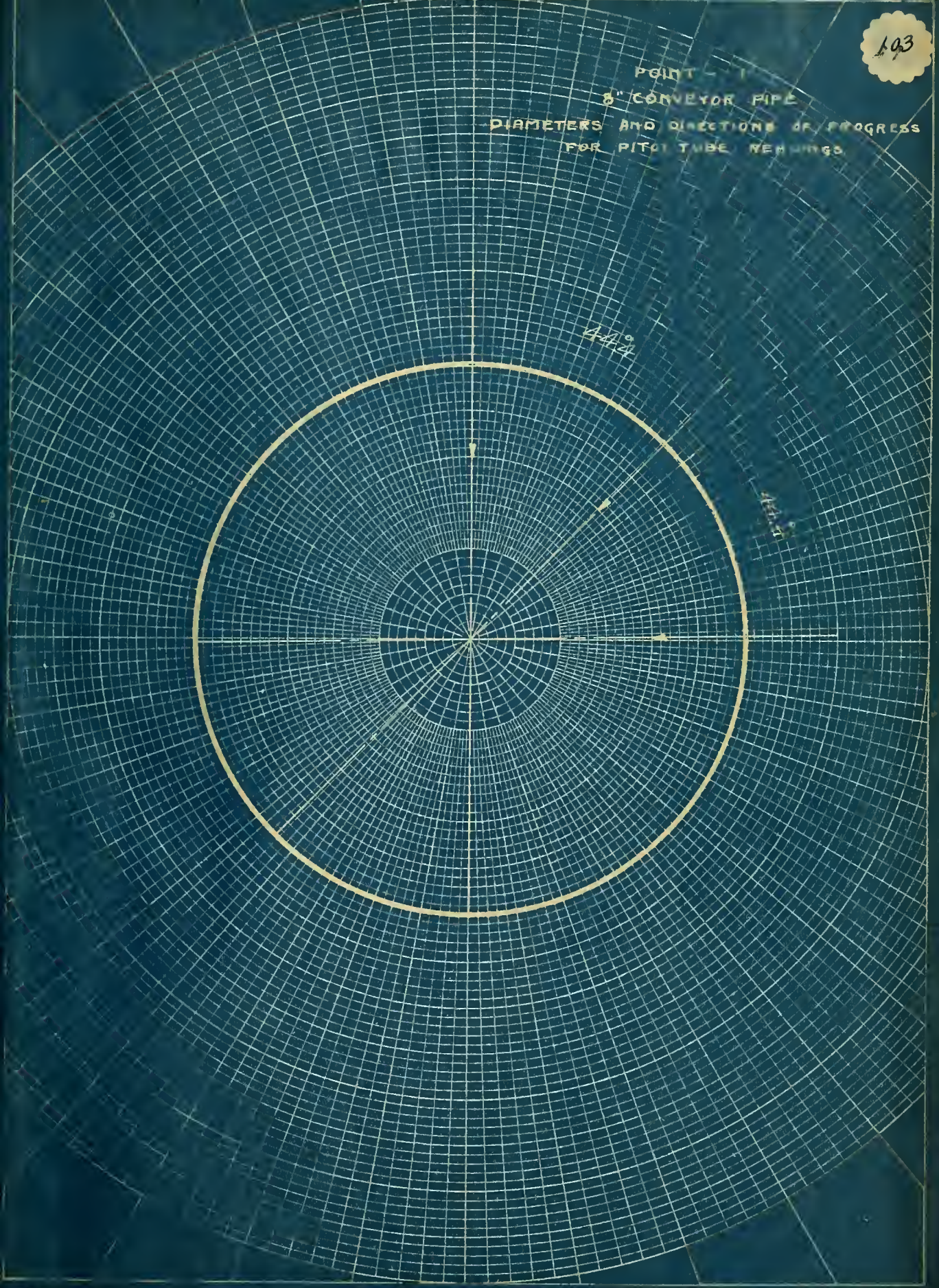

ALL BOILERS
300 H.P. B&W
"A"-"D"
#1
#2
20'-7 1/2"
25'-7
10'-6"
15'-4"
10'-6"
5'-9 3/4"
3'-10 1/4"
23'-6"
FIRE INTAKE
21'-10"
4'-0"
24'-0"
50'-0"

Please leave
people


ALL BOILERS
300 H.P. B.&W.
"A" & "D"
"B"
"C"
8" LATCH HEAVY STEEL PIPE
20'-7½"
25'-7"
33'-6½"
30'-9½"
#1
#2
#3
#4
#5
ASH INTAKES
℄ BOILER ROOM
8" EXTRA HEAVY STEEL PIPE
26'-6½"
17'-9½"
℄ SECTIONS
EXHAUSTER
DUST COLLECTOR
S

S
DOOR
MOTOR.
DUST COLLECTOR.
EXHAUSTER
DISCHARGE
50 TON ASH SEPARATOR TANK.
℄ TUNNEL
39'6"

POINT - 1
8" CONVEYOR PIPE
DIAMETERS AND DIRECTIONS OF PROGRESS
FOR PITOT TUBE READINGS



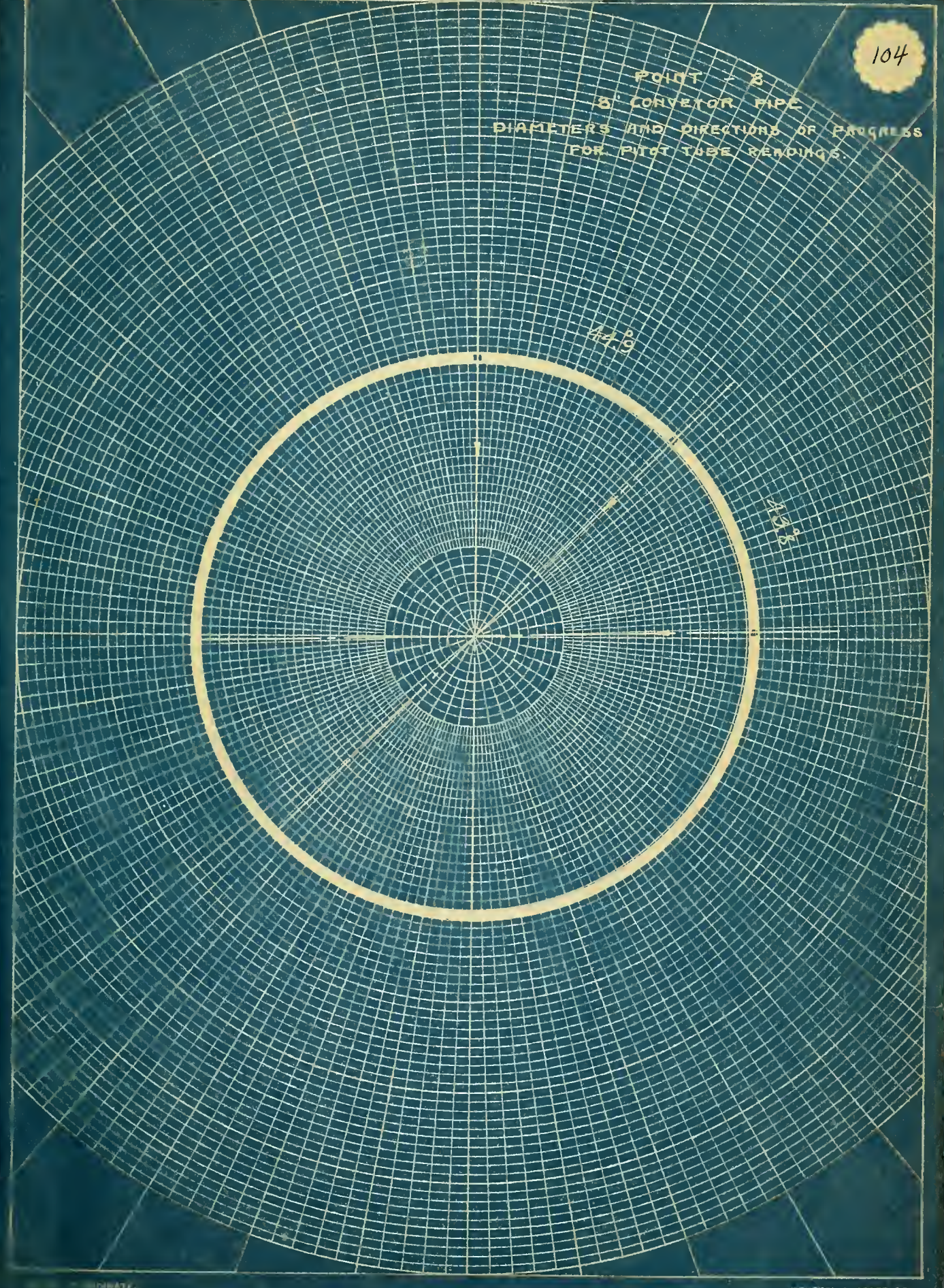
KEUFFEL & ESSER CO.

104

POINT - 8

8' CONVEYOR PIPE

DIAMETERS AND DIRECTIONS OF PROGRESS FOR PITOT TUBE READINGS.



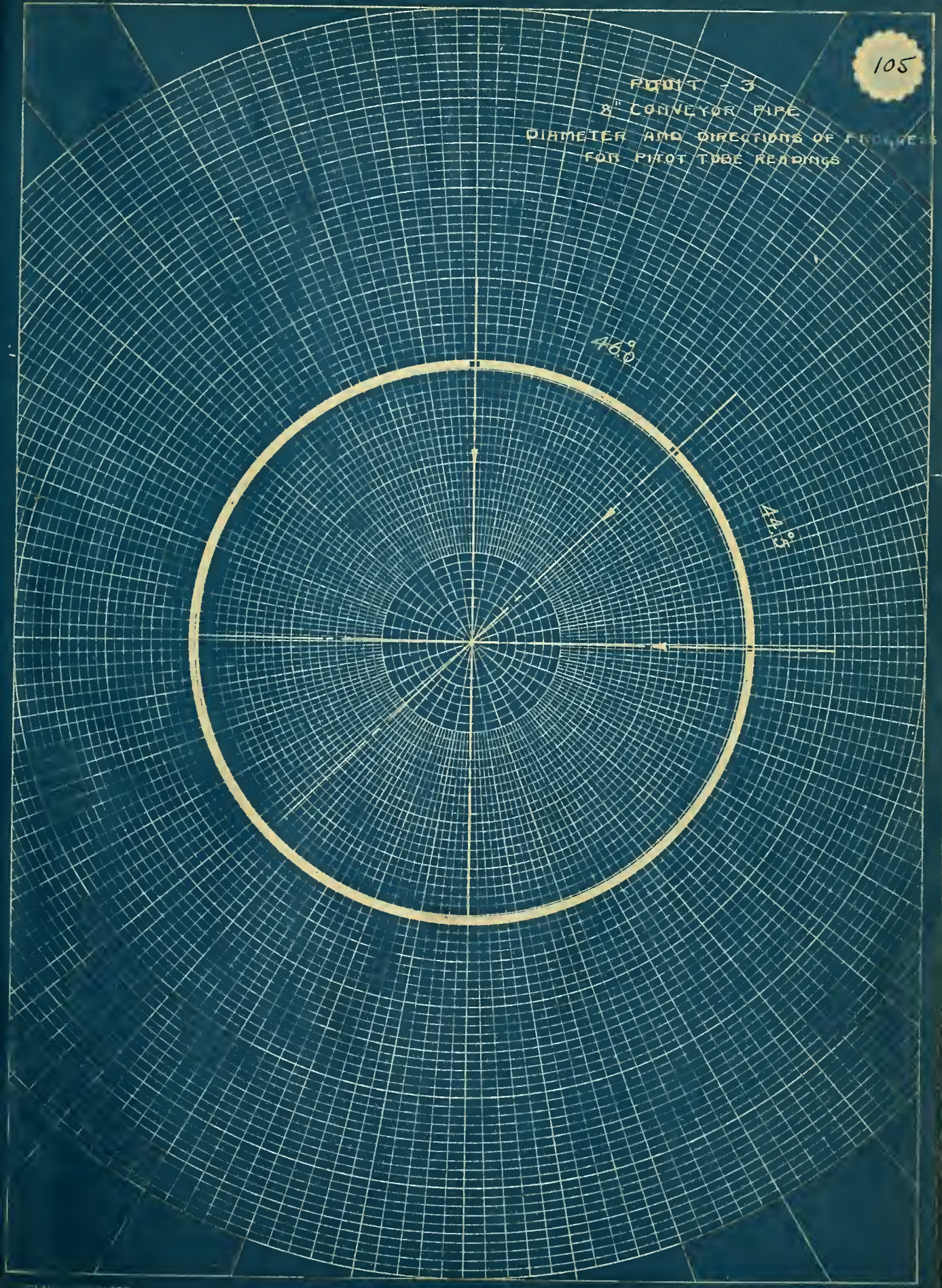
KEUFFEL & ESSER CO.

PLOT - 3

8" CONVEYOR PIPE

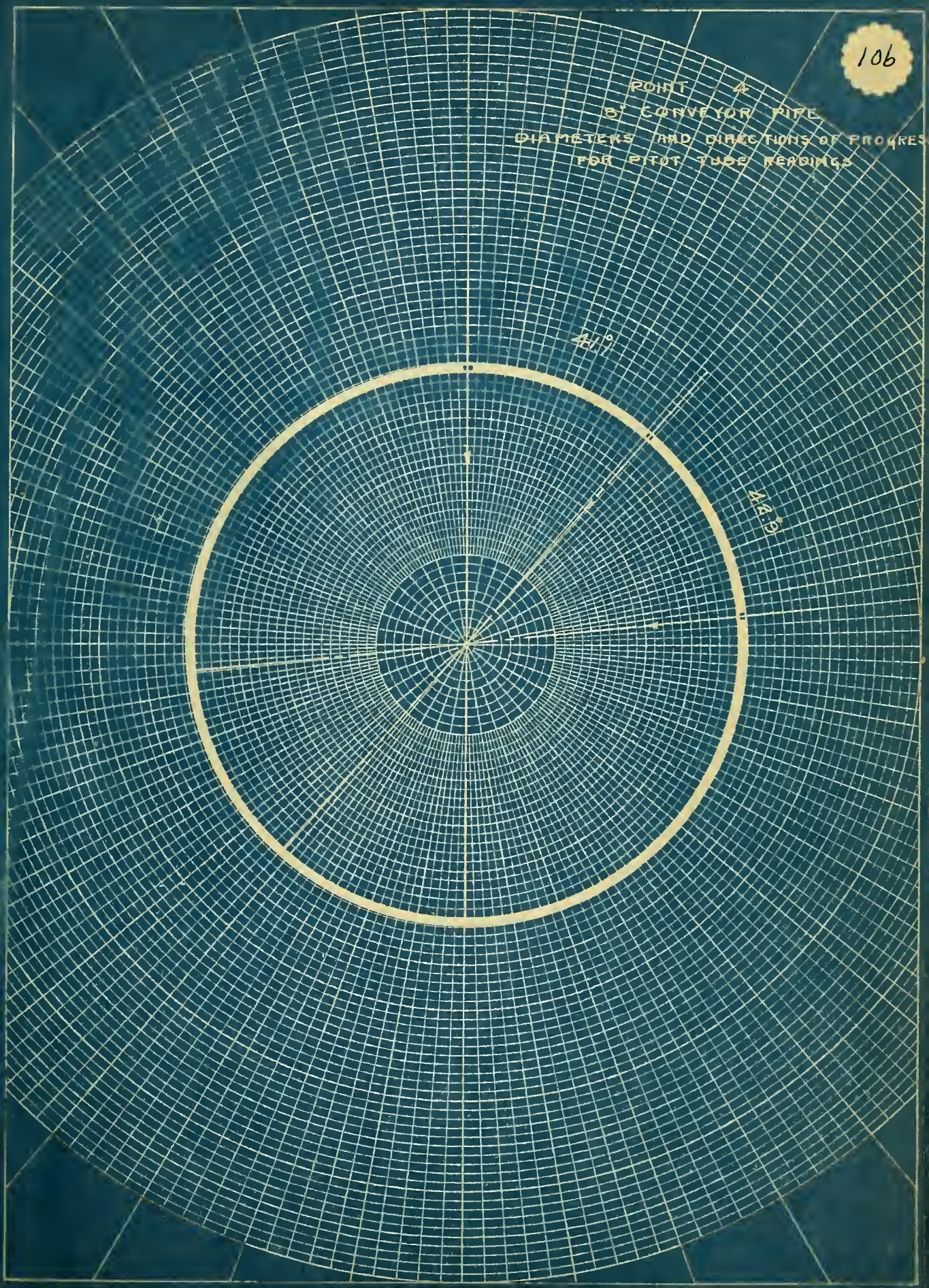
DIAMETER AND DIRECTIONS OF FIGURES

FOR PITOT TUBE READINGS



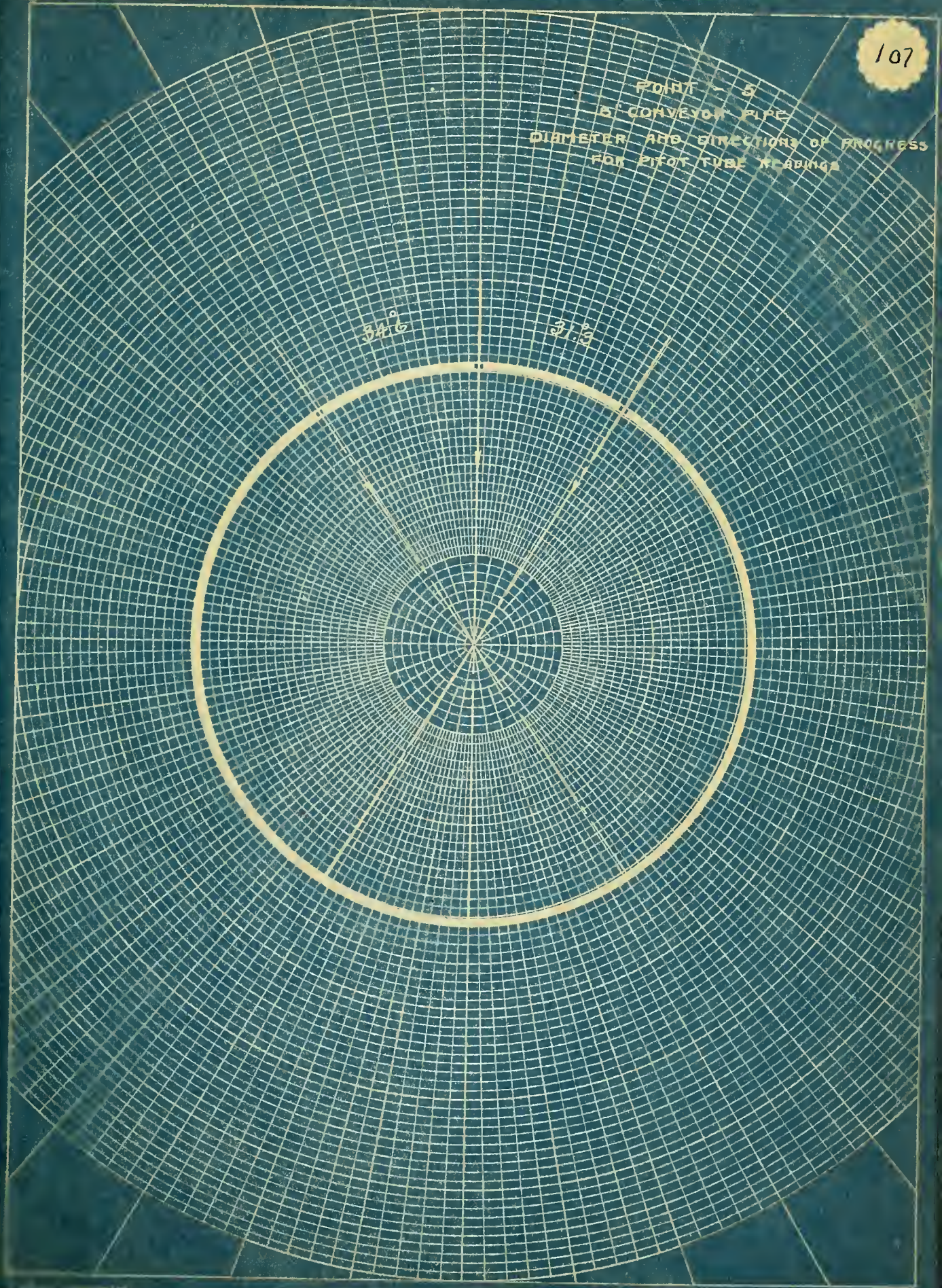
KEUFFEL & ESSER

POINT A
8" CONVEYOR PIPE
DIAMETERS AND DIRECTIONS OF PROGRES
FOR PITOT TUBE READINGS



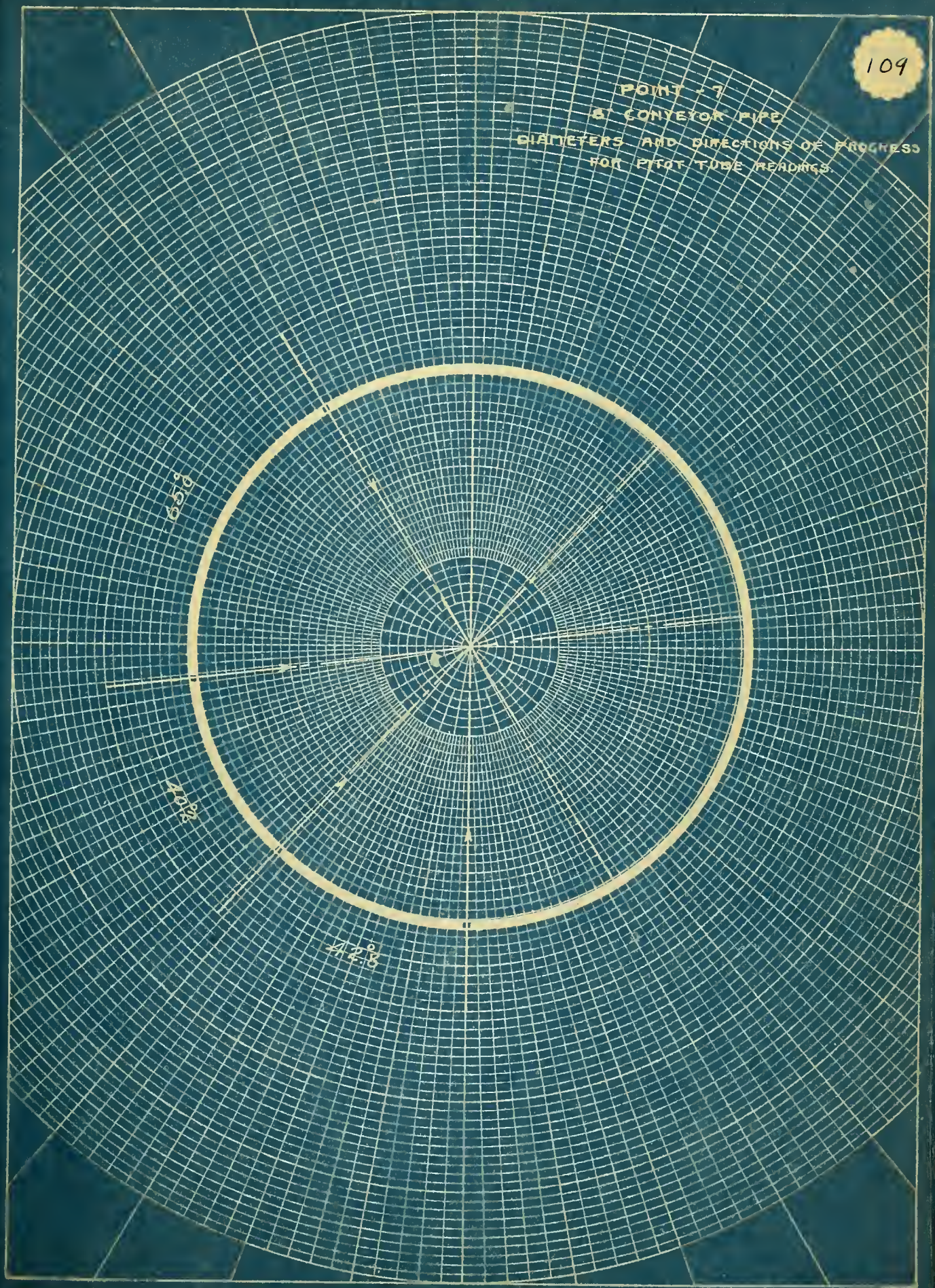
POLAR COORDINATE.
KEUFFEL & ESSER CO.

POINT - 5
5' CONVEYOR PIPE
DIAMETER AND DIRECTIONS OF PROGRESS
FOR PITOT TUBE READINGS



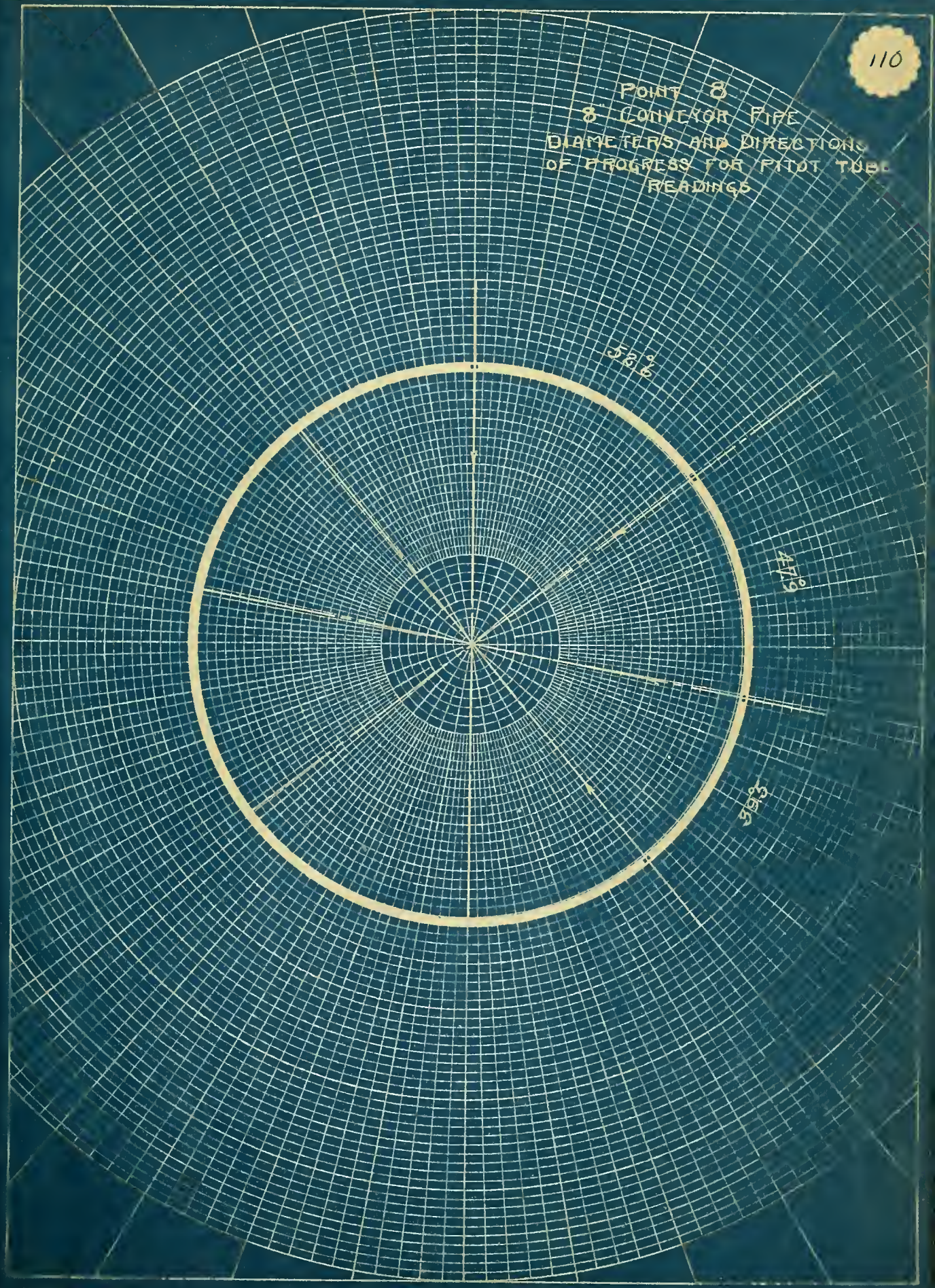
KEUFFEL & ESSER CO.

POINT - 7
& CONVEYOR PIPE
DIAMETERS AND DIRECTIONS OF PROGRESS
FOR PITOT TUBE READINGS.



POLAR CO-ORDINATE.

KEUFFEL & ESSER CO.

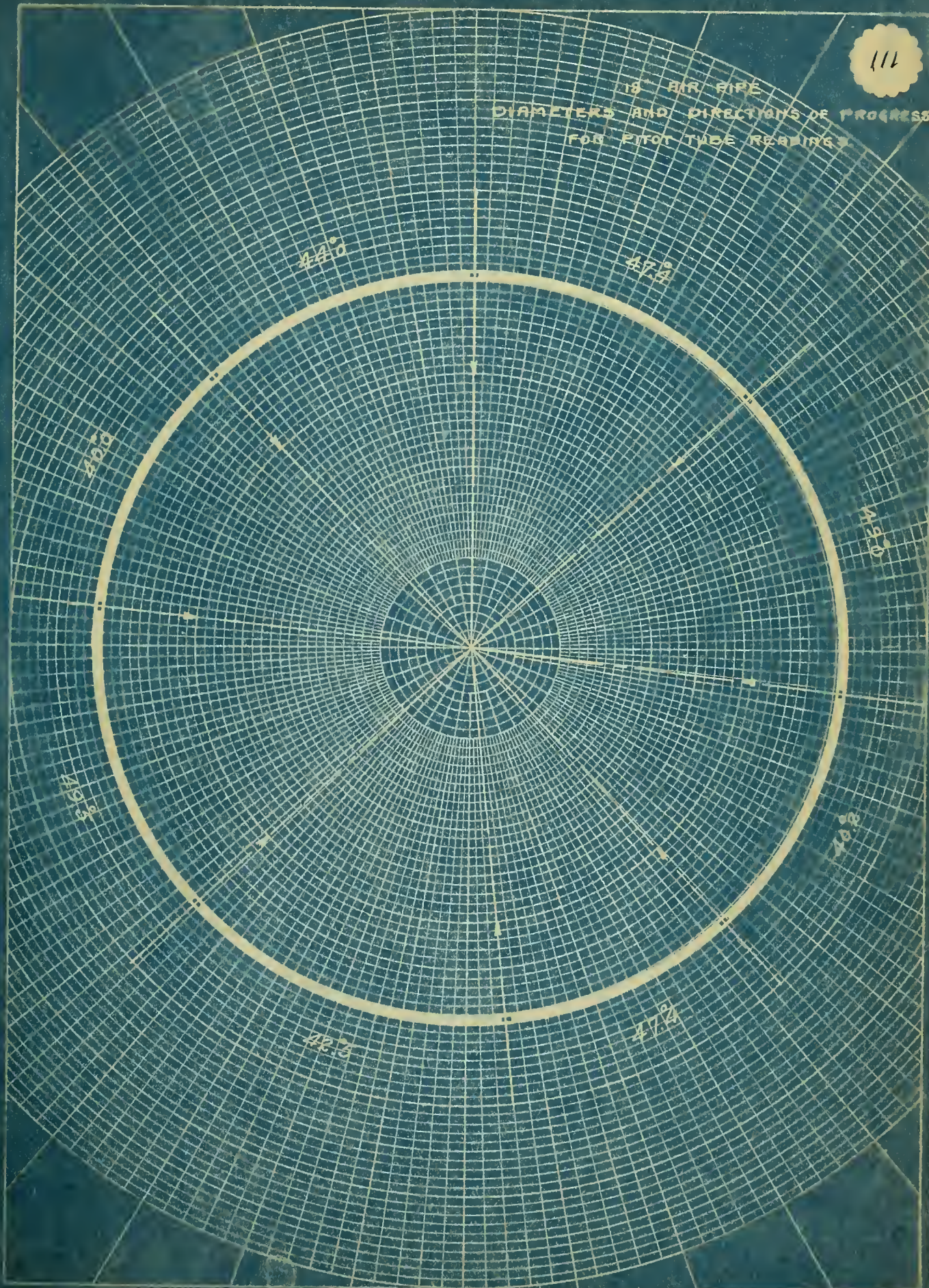


CO-ORDINATE.
KEUFFEL & ESSER

18 AIR PIPE

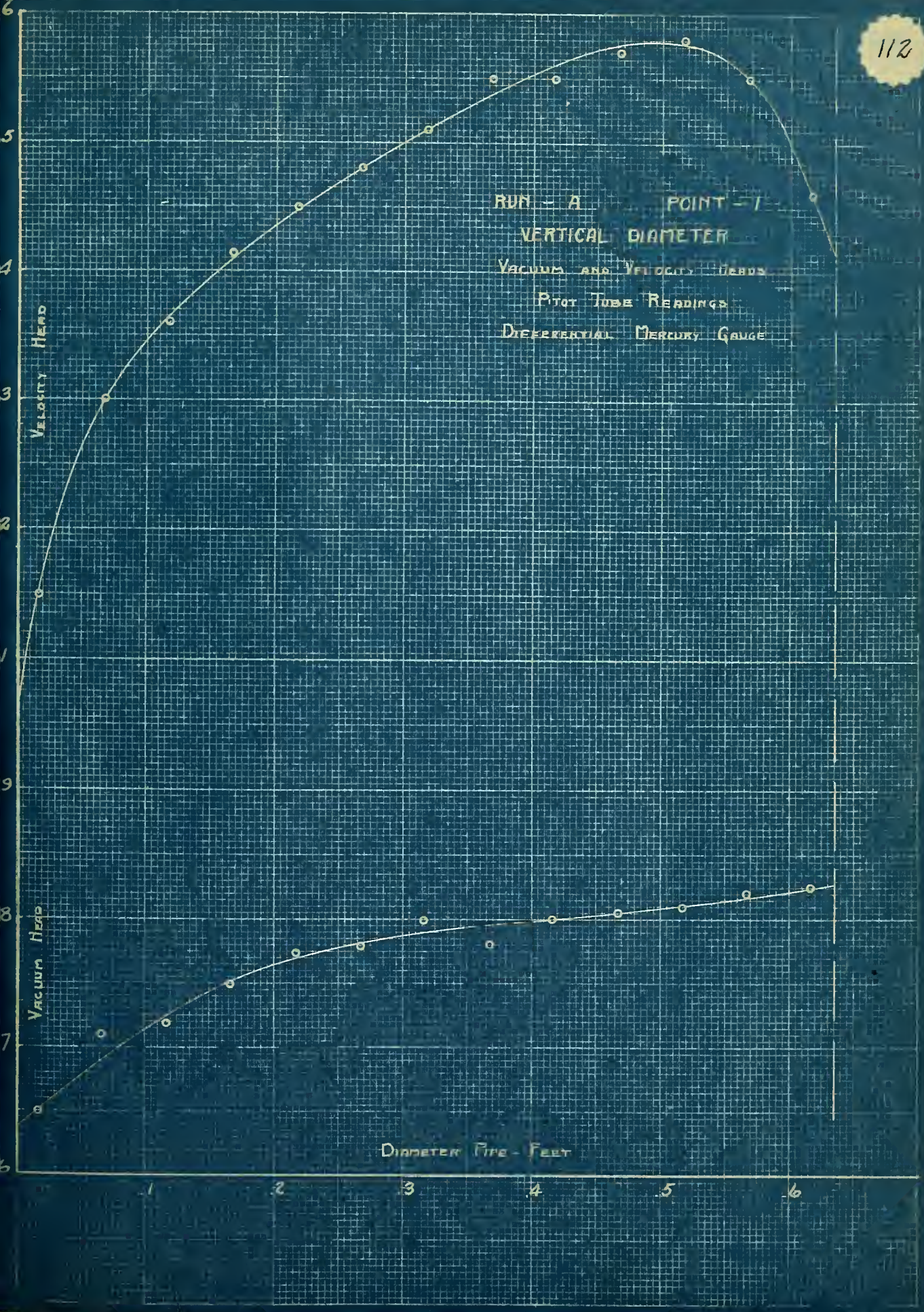
DIAMETERS AND DIRECTIONS OF PROGRESS

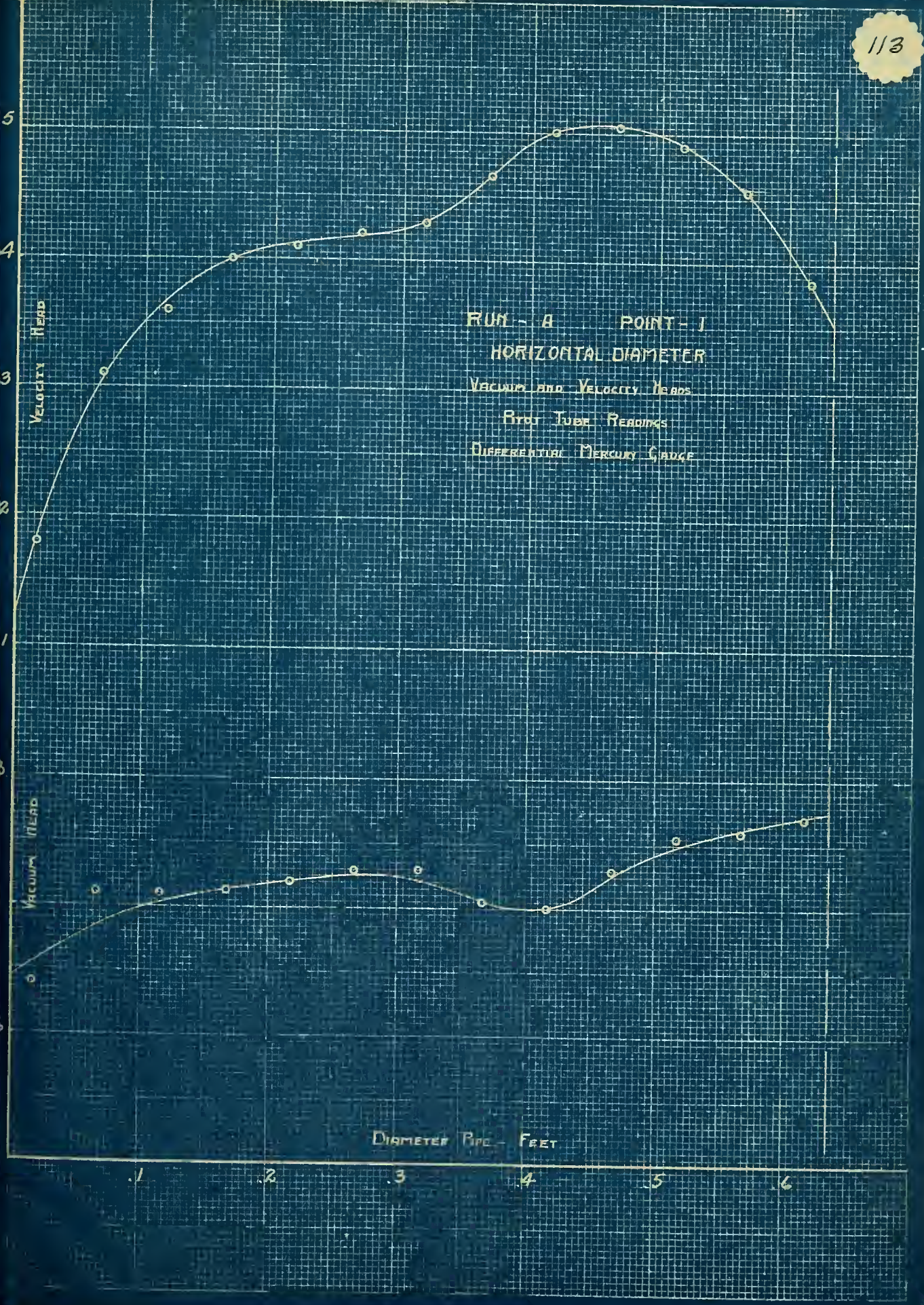
FOR PITOT TUBE READINGS

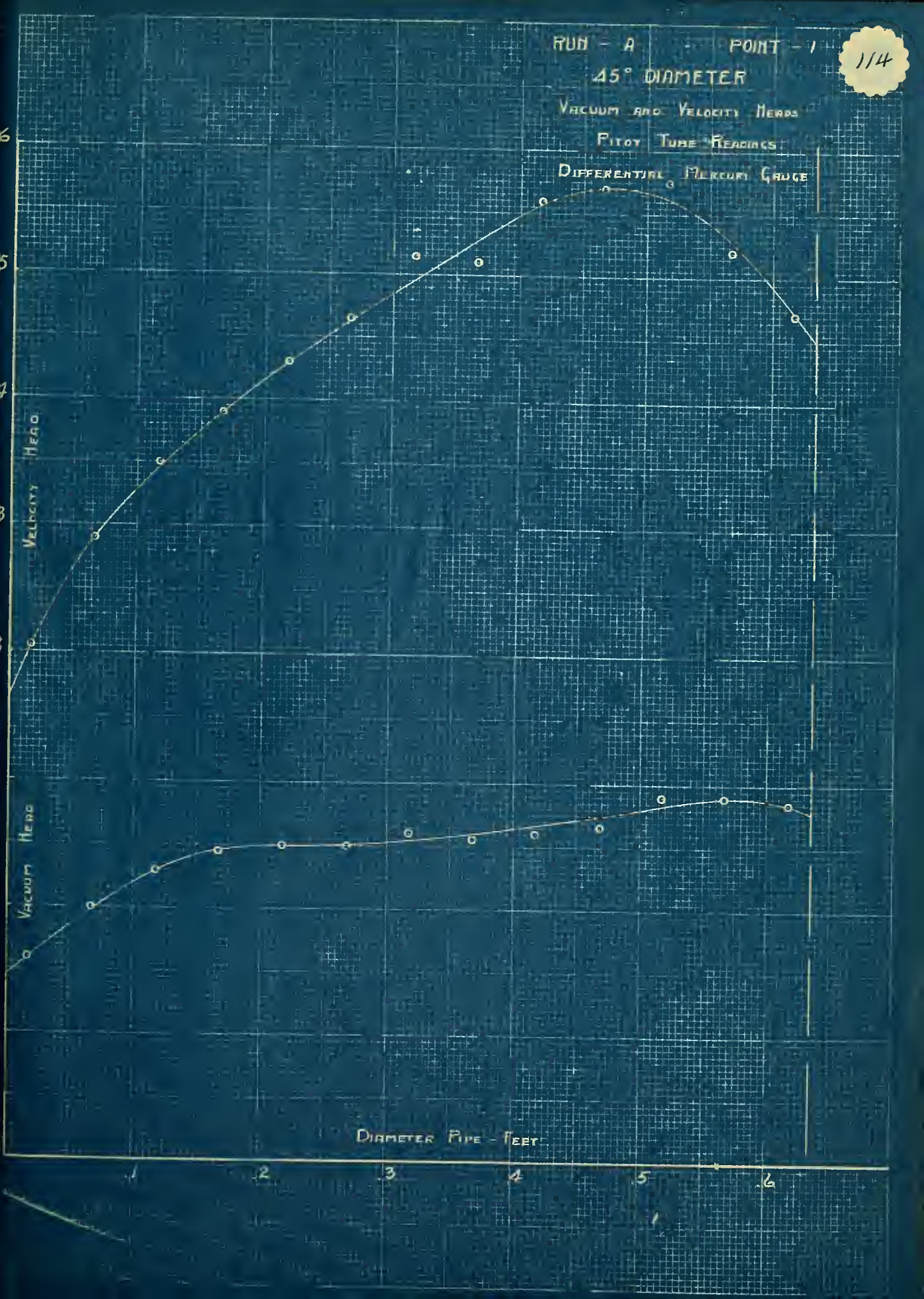


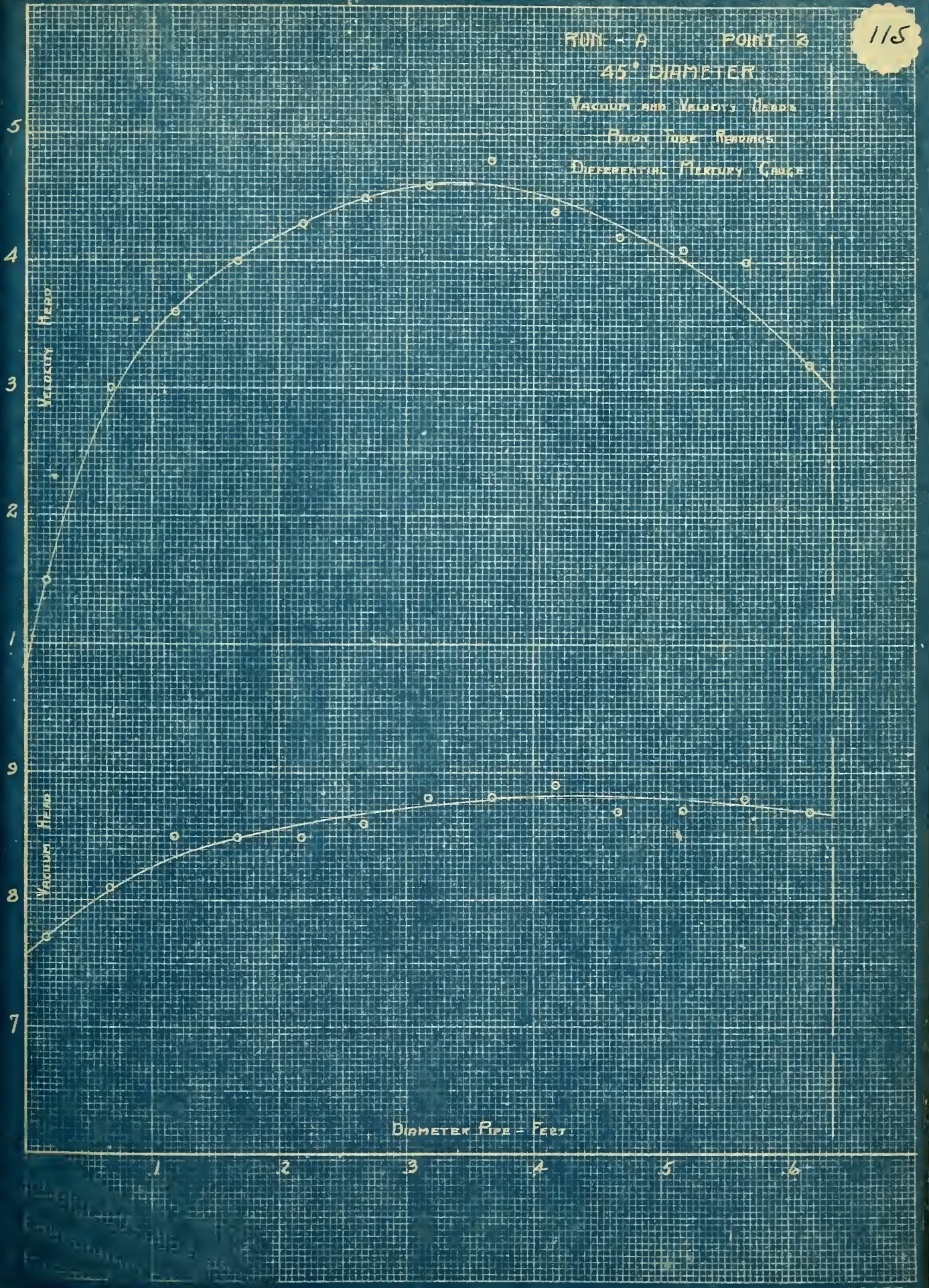
AIR CO-ORDINATE

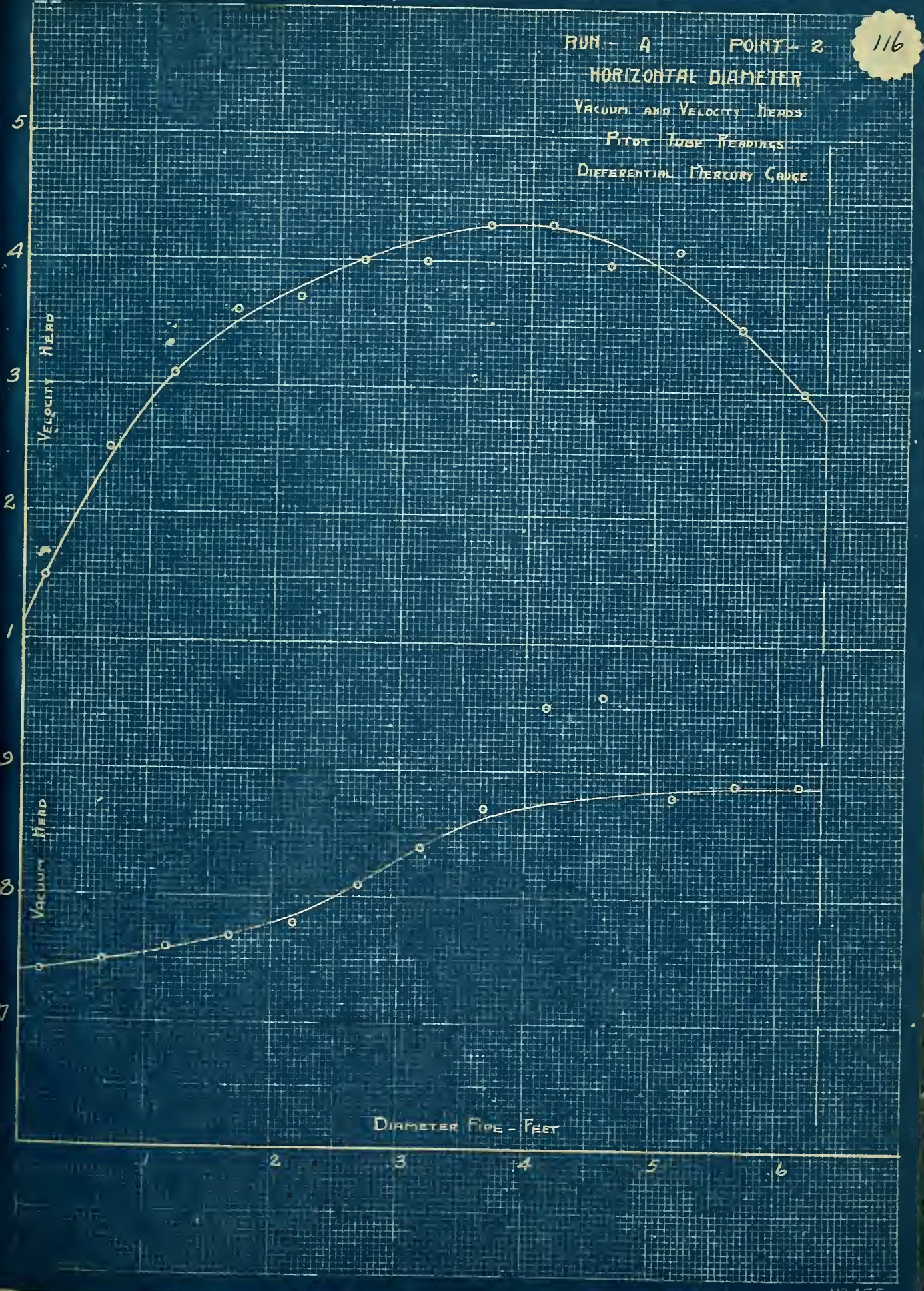
KEUFFEL & ESSER CO.

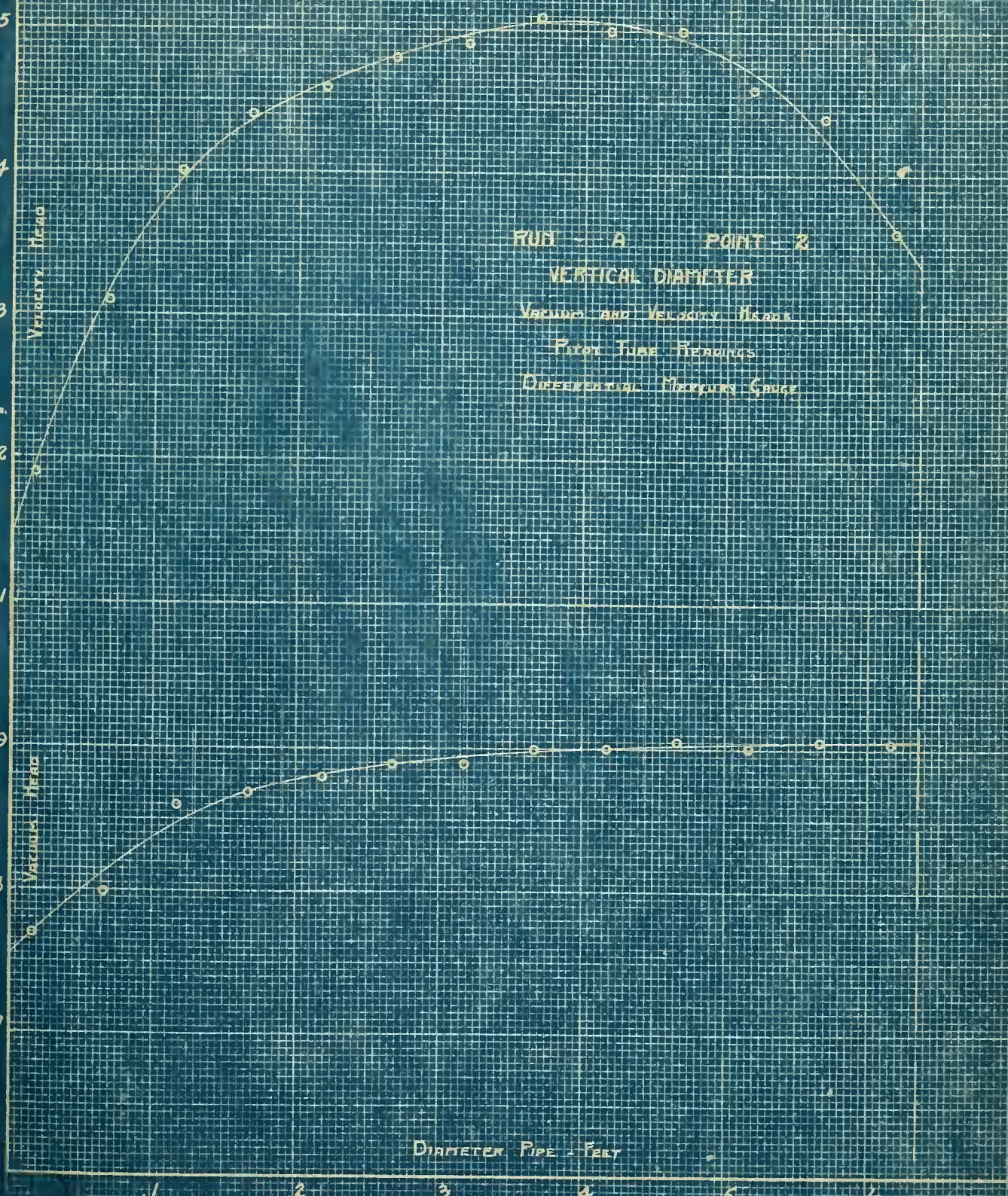

RUN - A POINT - 1
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
.1
.2
.3
.4
.5
.6
.7
.8
.9
1
2
3
4
5
6


RUN - A POINT - J
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
.1
.2
.3
.4
.5
.6
1
2
3
4
5


RUN - A POINT - 1
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
.1
.2
.3
.4
.5
.6


RUN - A
POINT - 2
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
115
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE = FEET
5
4
3
2
1
.9
.8
.7
1
2
3
4
5
6


RUN - A POINT - 2
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
5
4
3
2
1
.9
.8
.7
1
2
3
4
5
6


RUN - A POINT - Z
VERTICAL DIAMETER
VELOCITY AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
5
4
3
2
1
9
8
7
.1
.2
.3
.4
.5
.6

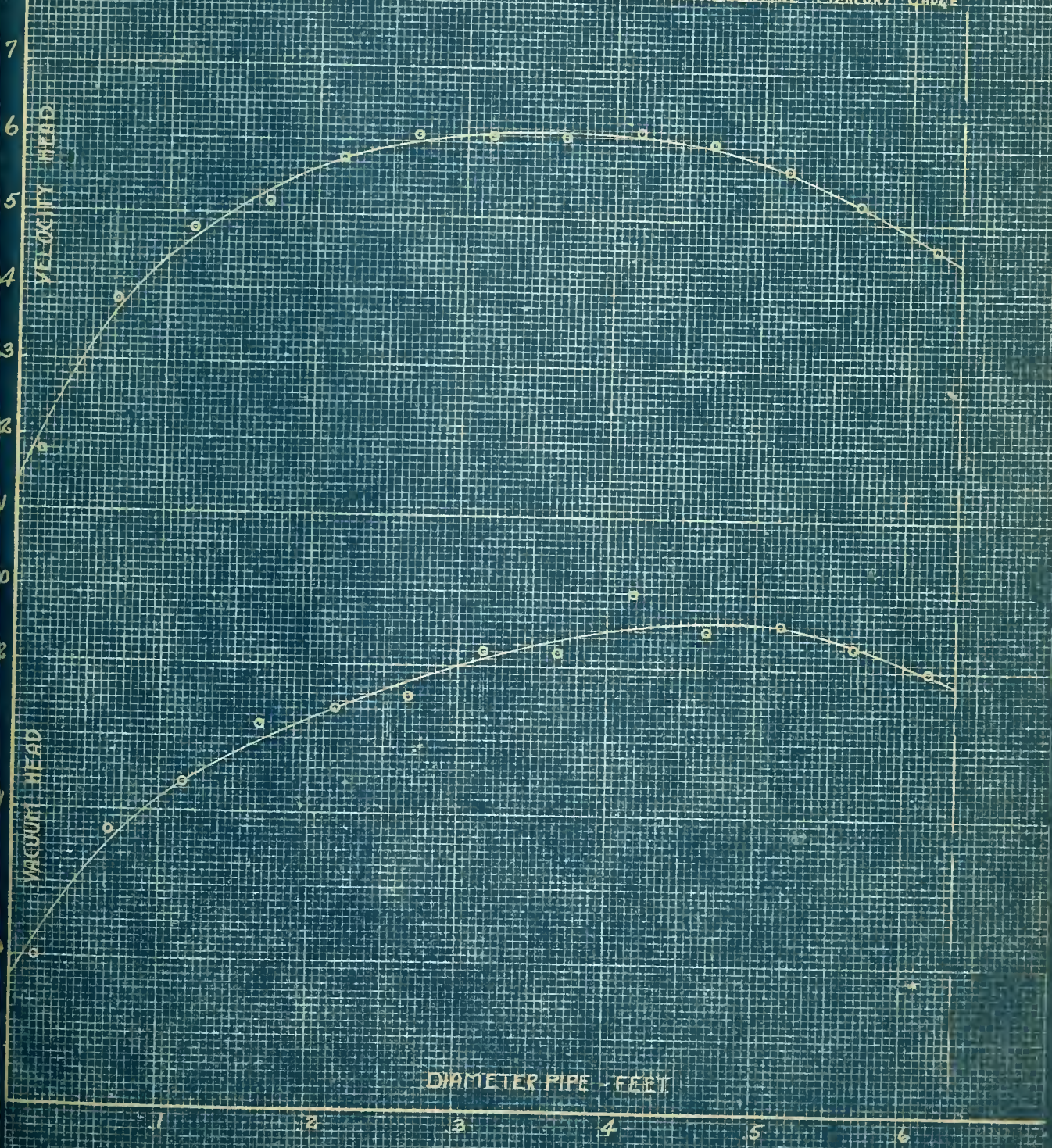
RUN - A POINT - 3

45" DIAMETER

VACUUM AND VELOCITY HEADS

PITOT TUBE READINGS

DIFFERENTIAL MERCURY GAUGE



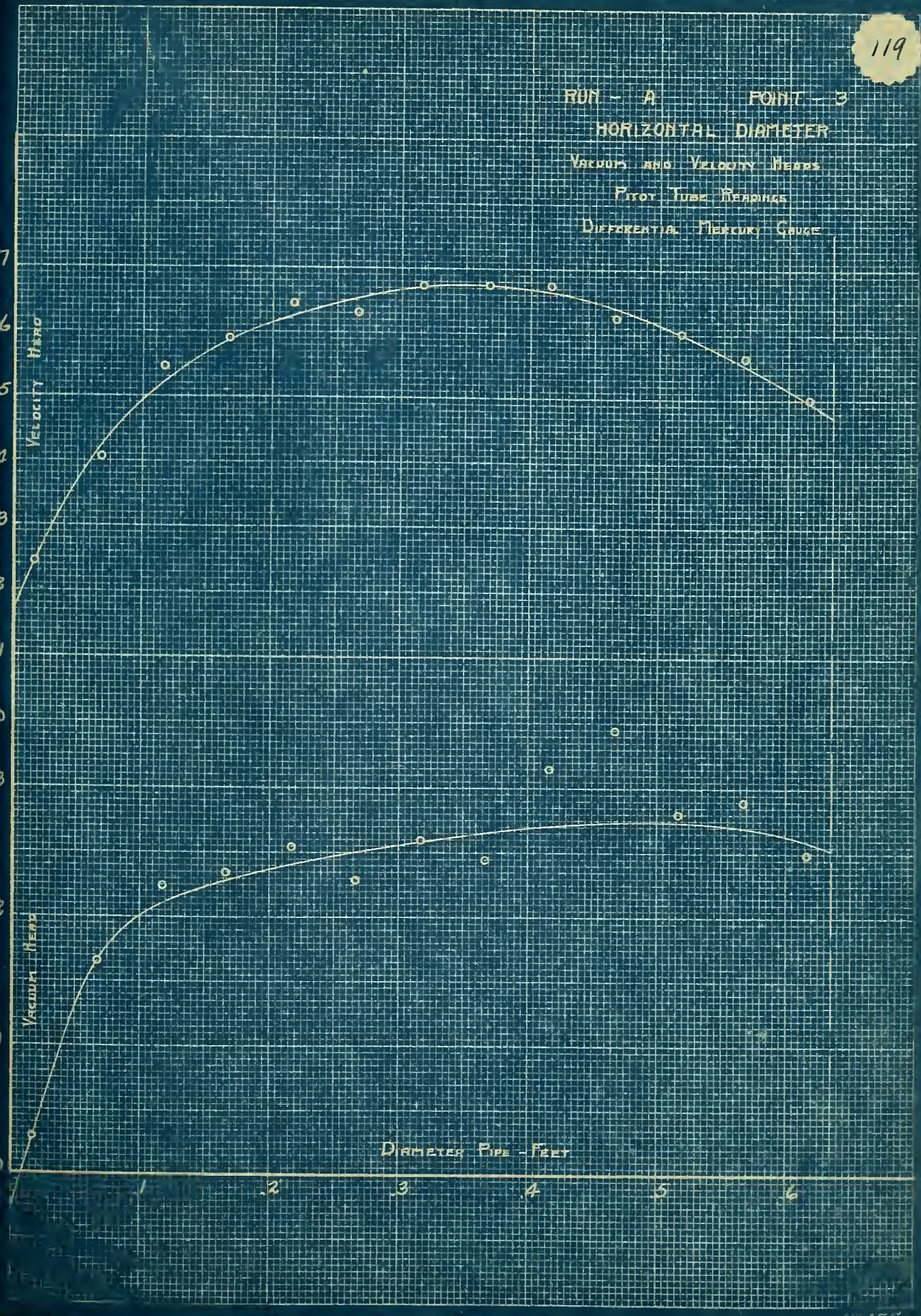
RUN - A POINT - 3

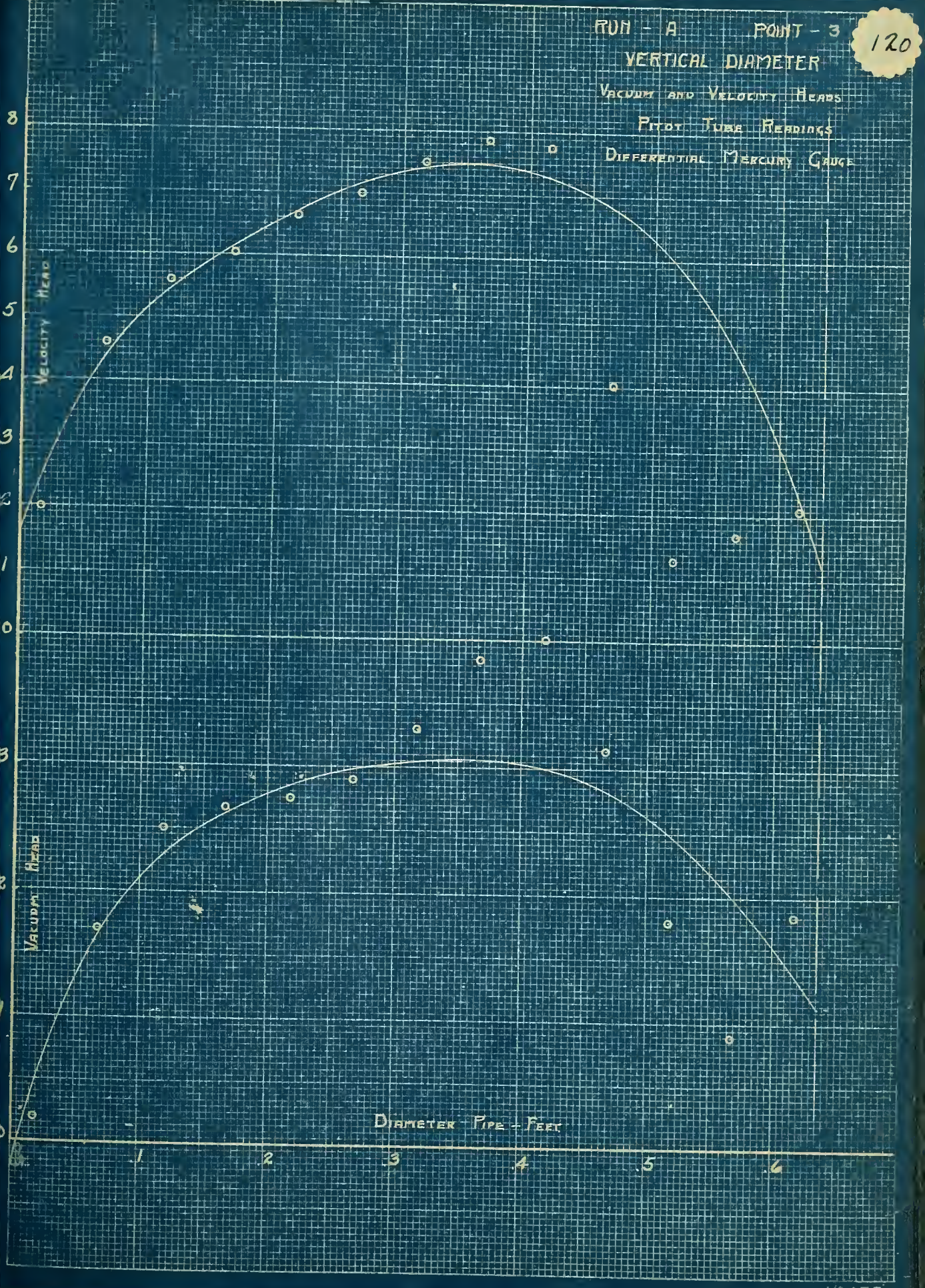
HORIZONTAL DIAMETER

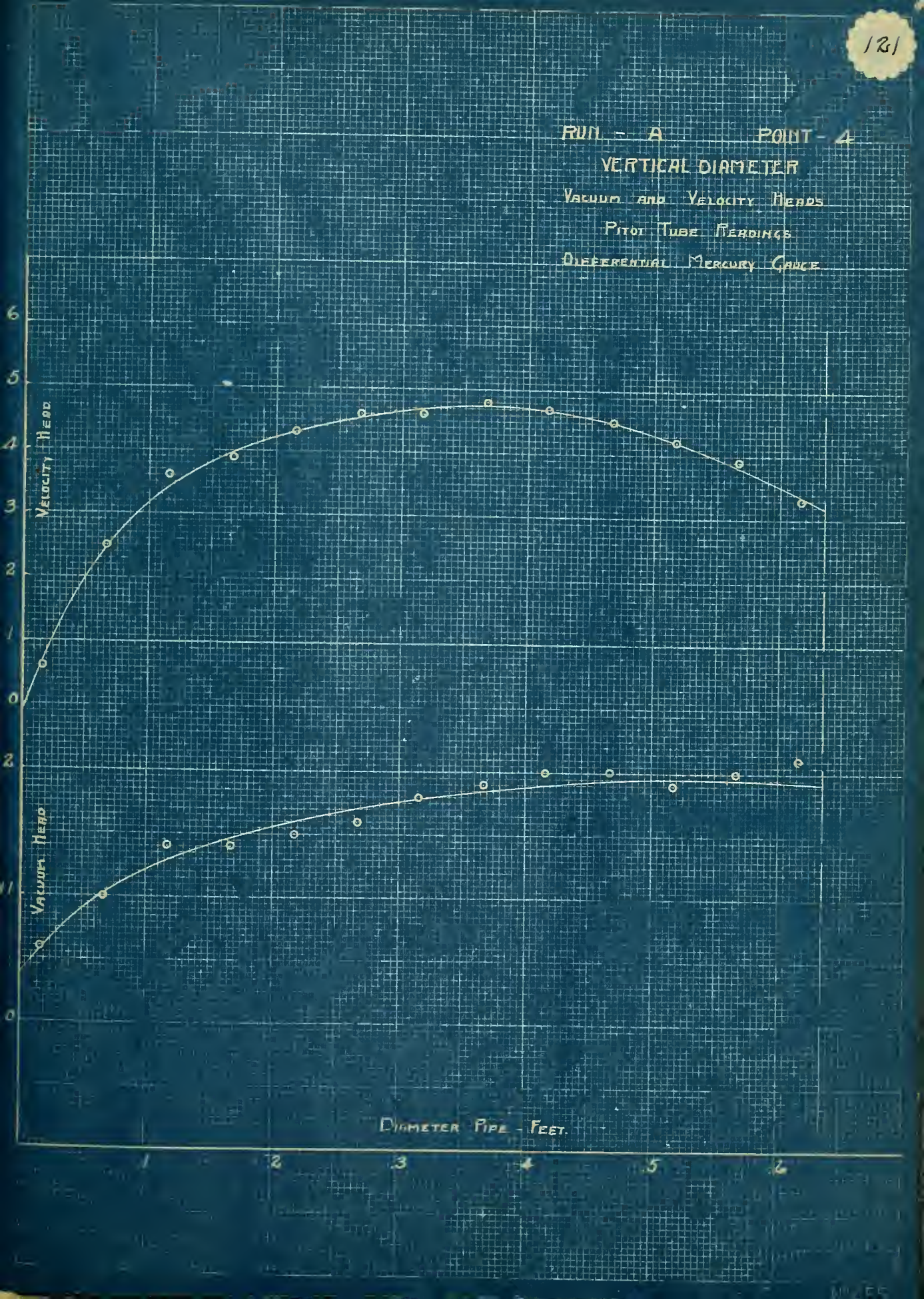
VACUUM AND VELOCITY HEADS

PITOT TUBE READINGS

DIFFERENTIAL MERCURY GAUGE




RUN - A POINT - 3
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
8
7
6
5
4
3
2
1
0
3
2
1
0
1
2
3
4
5
6


RUN - A POINT - 4
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET.
6
5
4
3
2
1
0
2
1
0
1
2
3
4
5
6

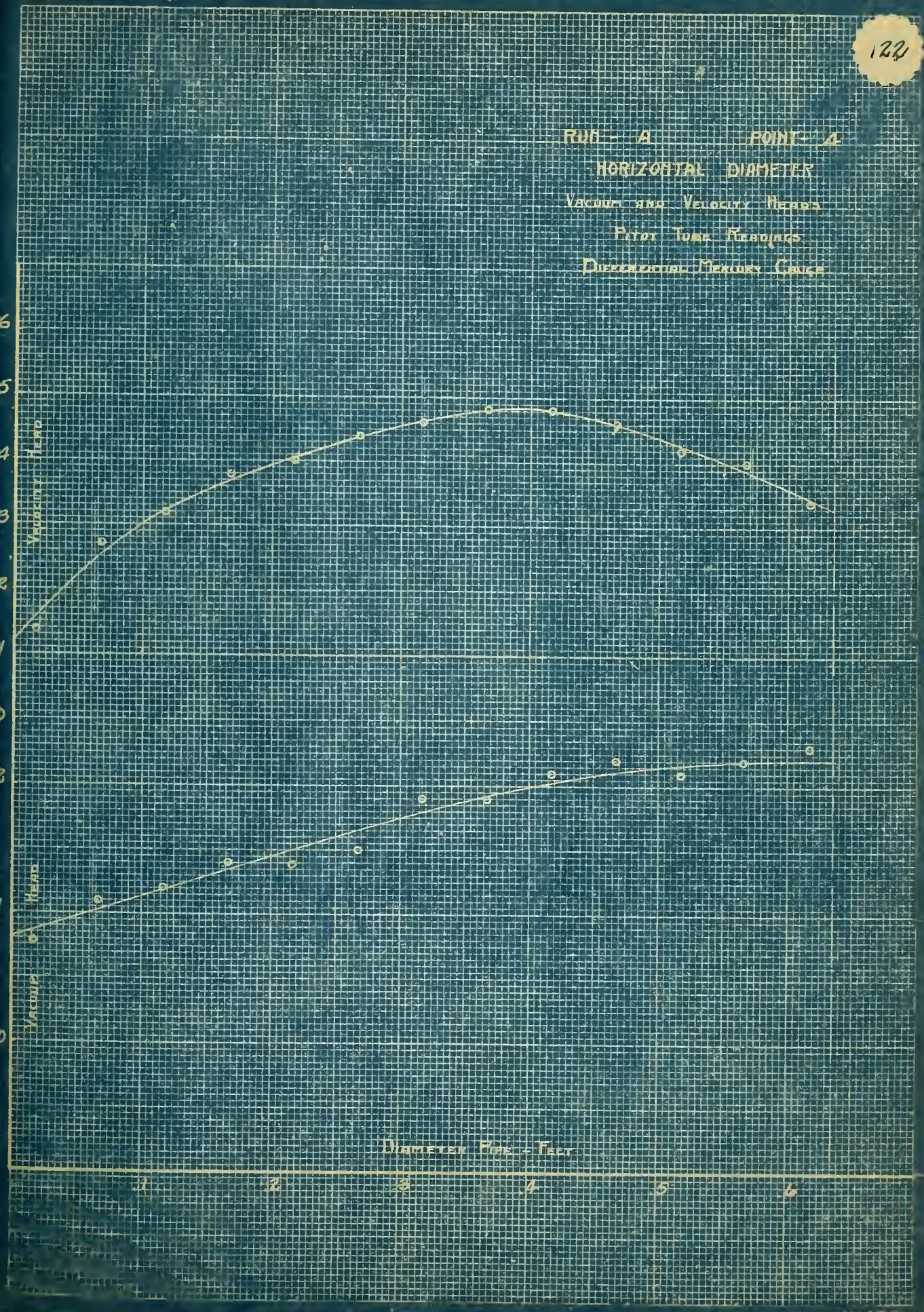
RUN - A POINT - 4

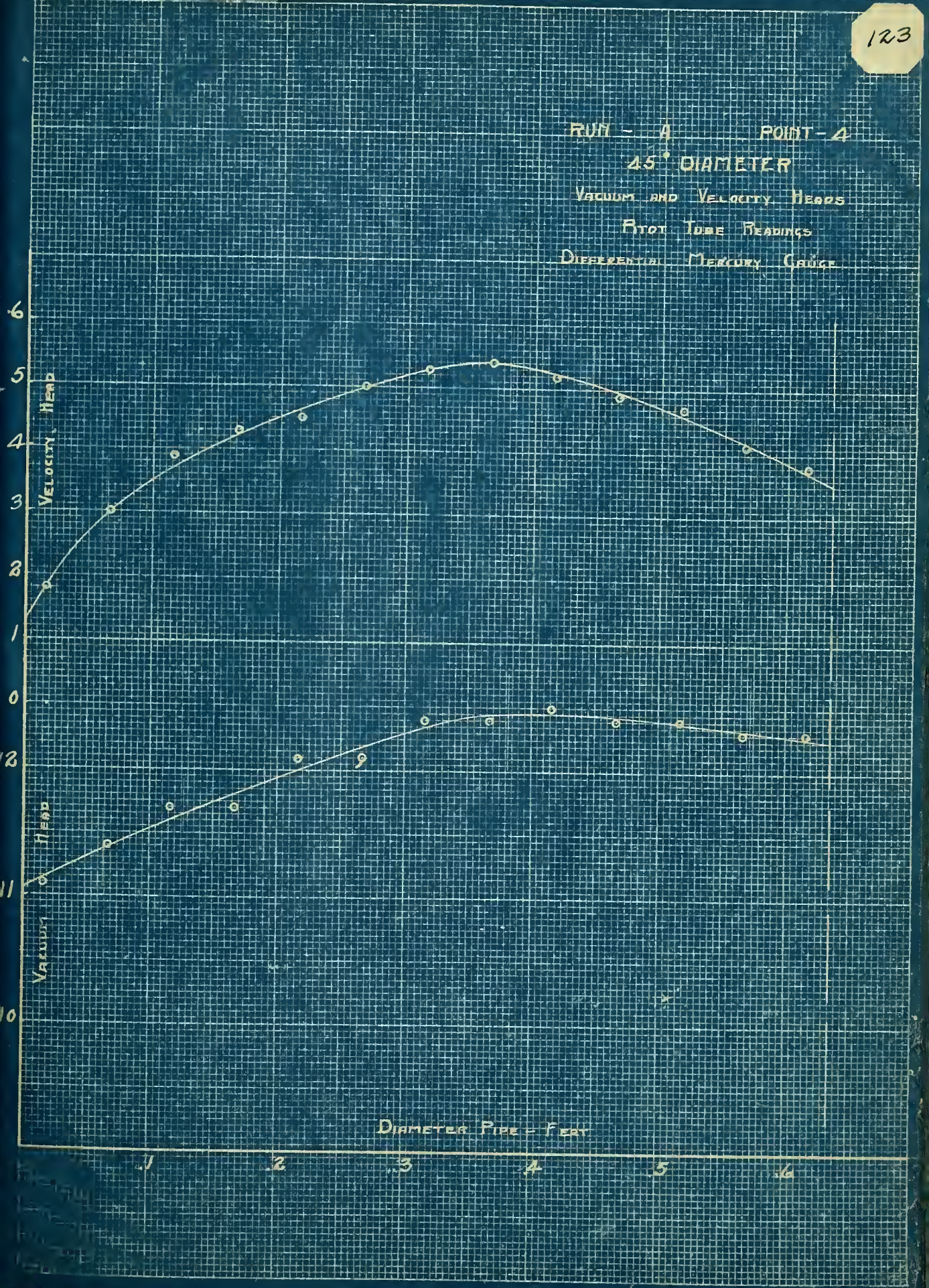
HORIZONTAL DIAMETER

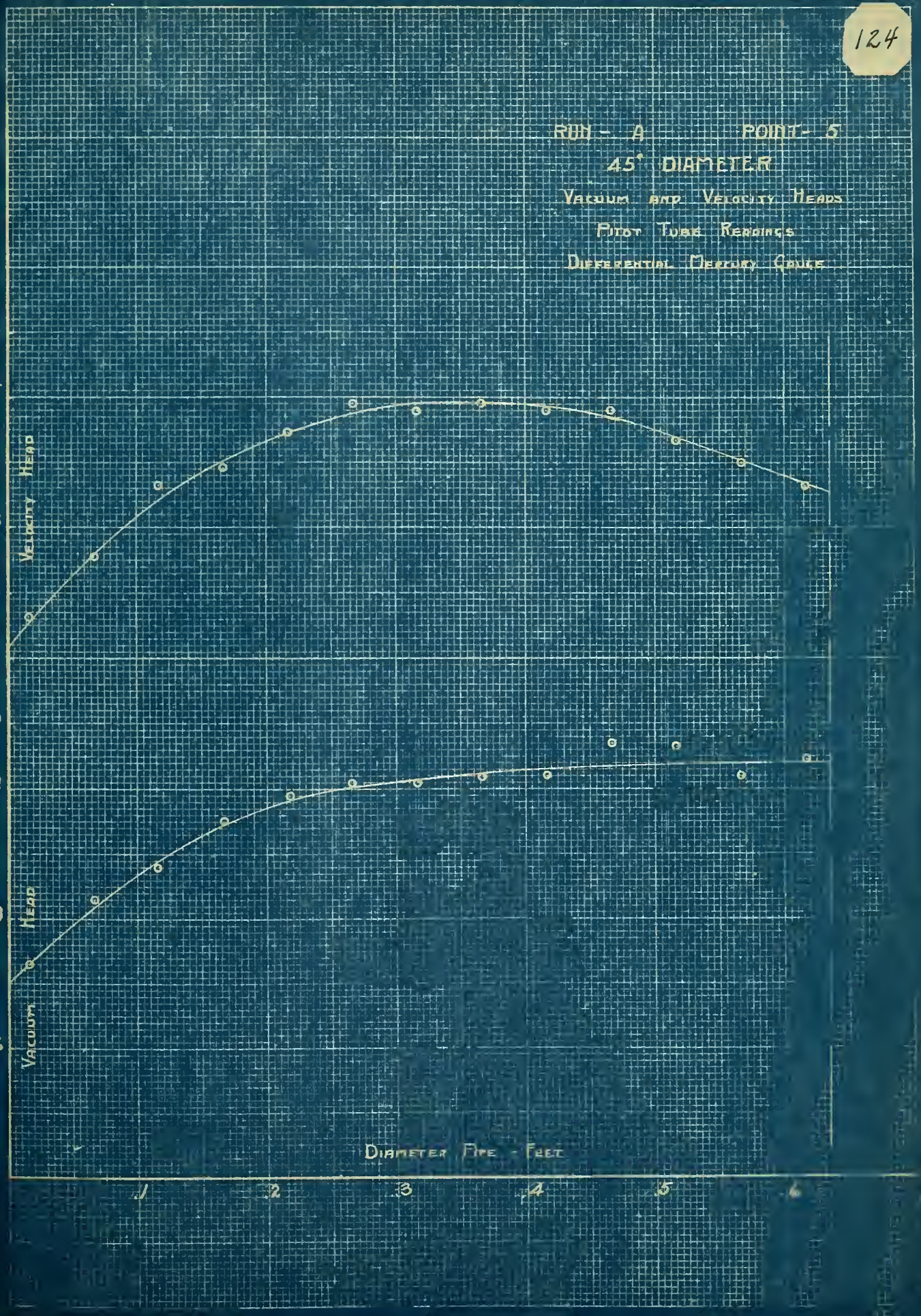
VACUUM AND VELOCITY HEADS

PITOT TUBE READINGS

DIFFERENTIAL MERCURY GAUGE




RUN - A POINT - 4
4.5" DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
.6
.5
.4
.3
.2
.1
0
.12
.11
.10
.1
.2
.3
.4
.5
.6


RUN - A POINT - 5
45" DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
6
5
4
3
2
1
0
.14
.13
.12
.1
.2
.3
.4
.5
.6

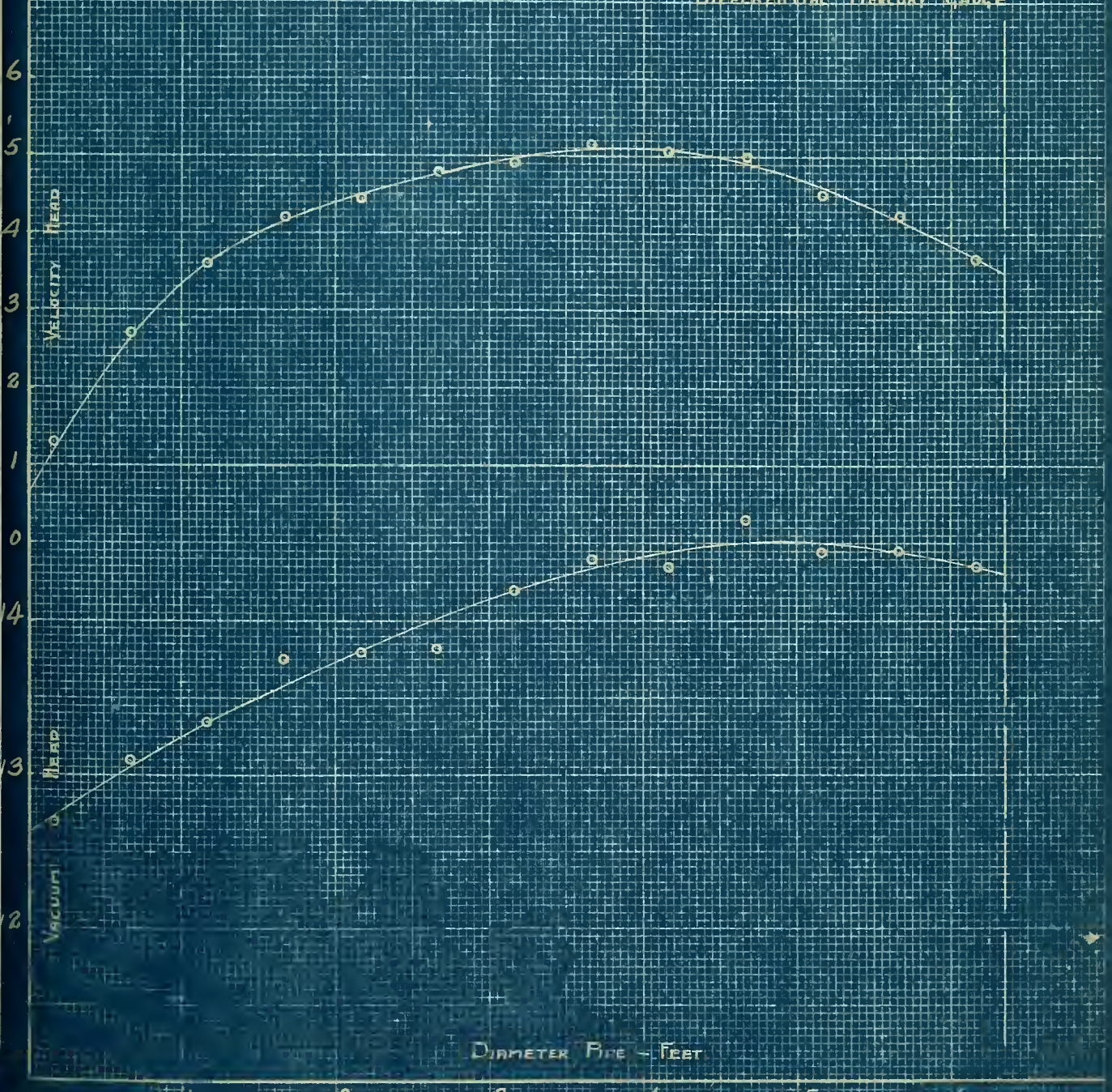
RUN - A POINT - 5

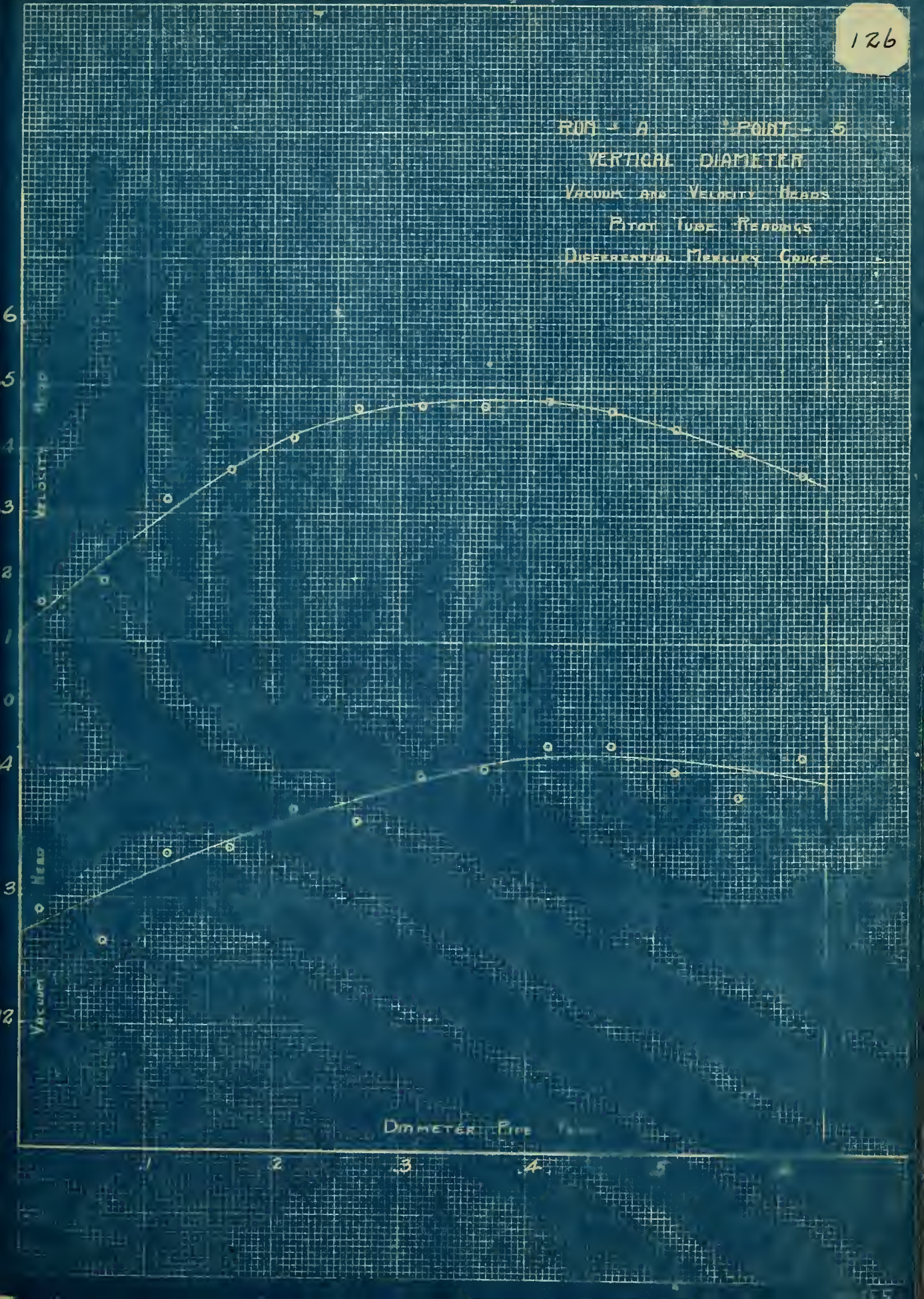
45° DIAMETER

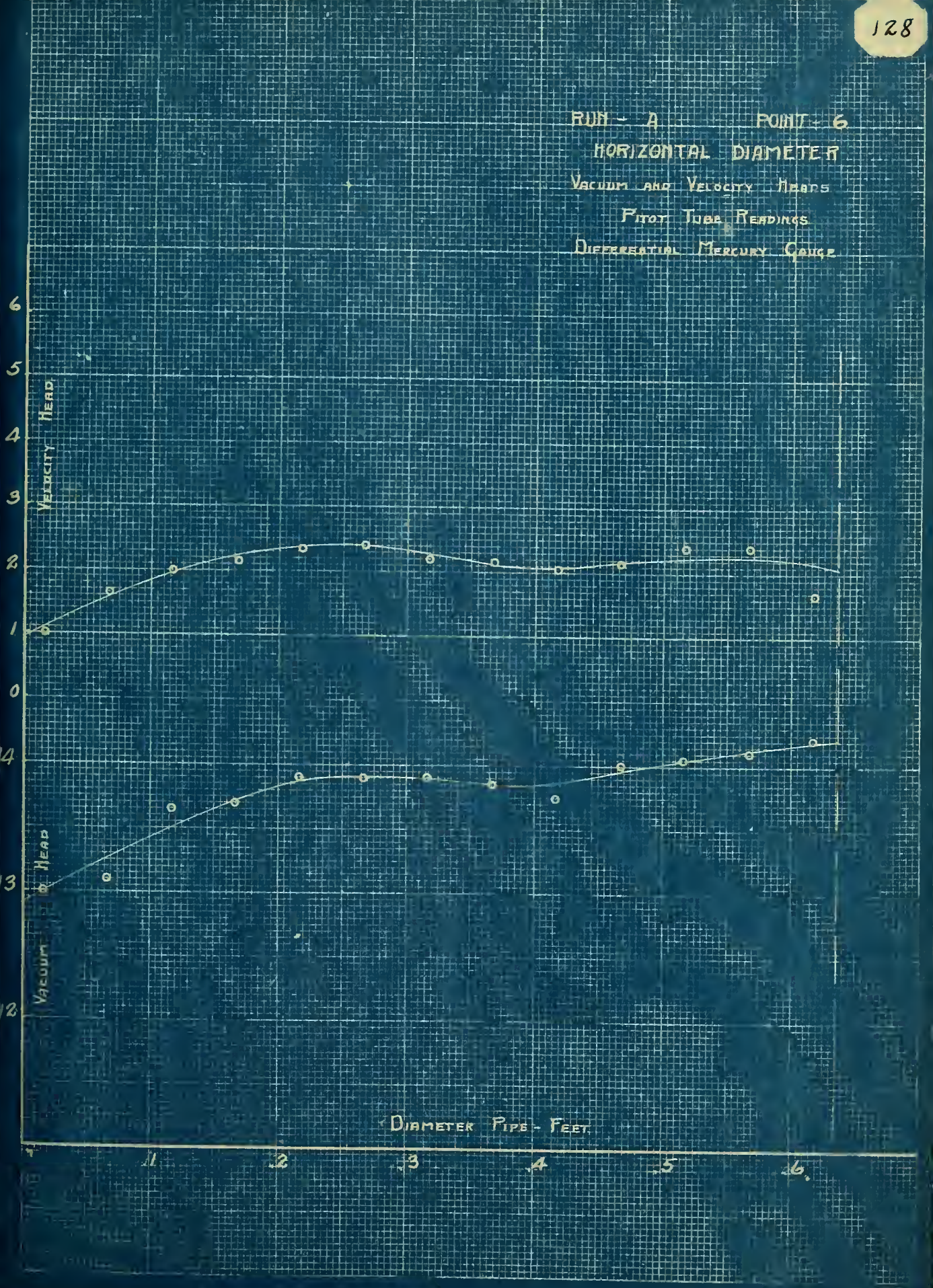
VACUUM AND VELOCITY HEADS

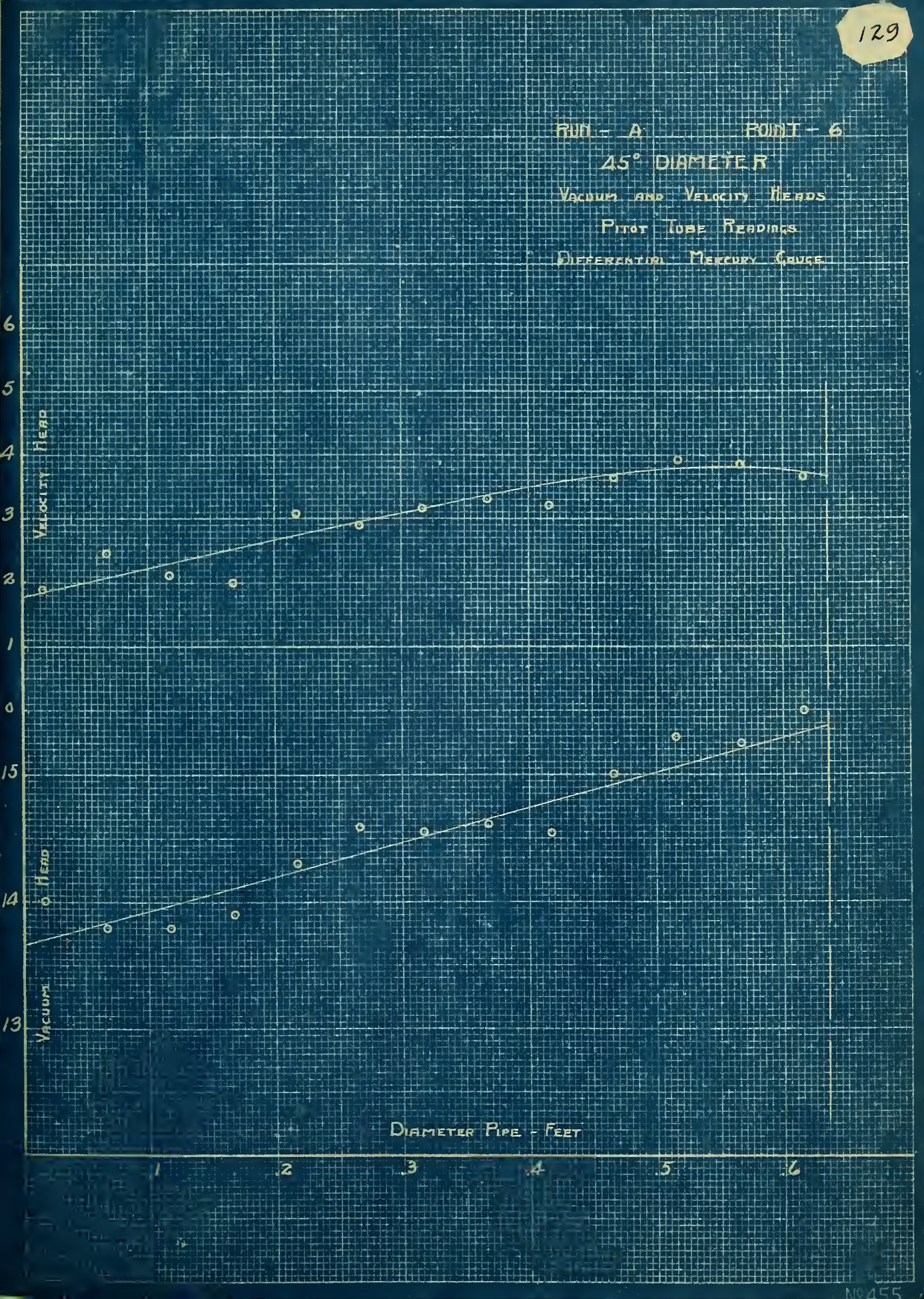
PITOT TUBE READINGS

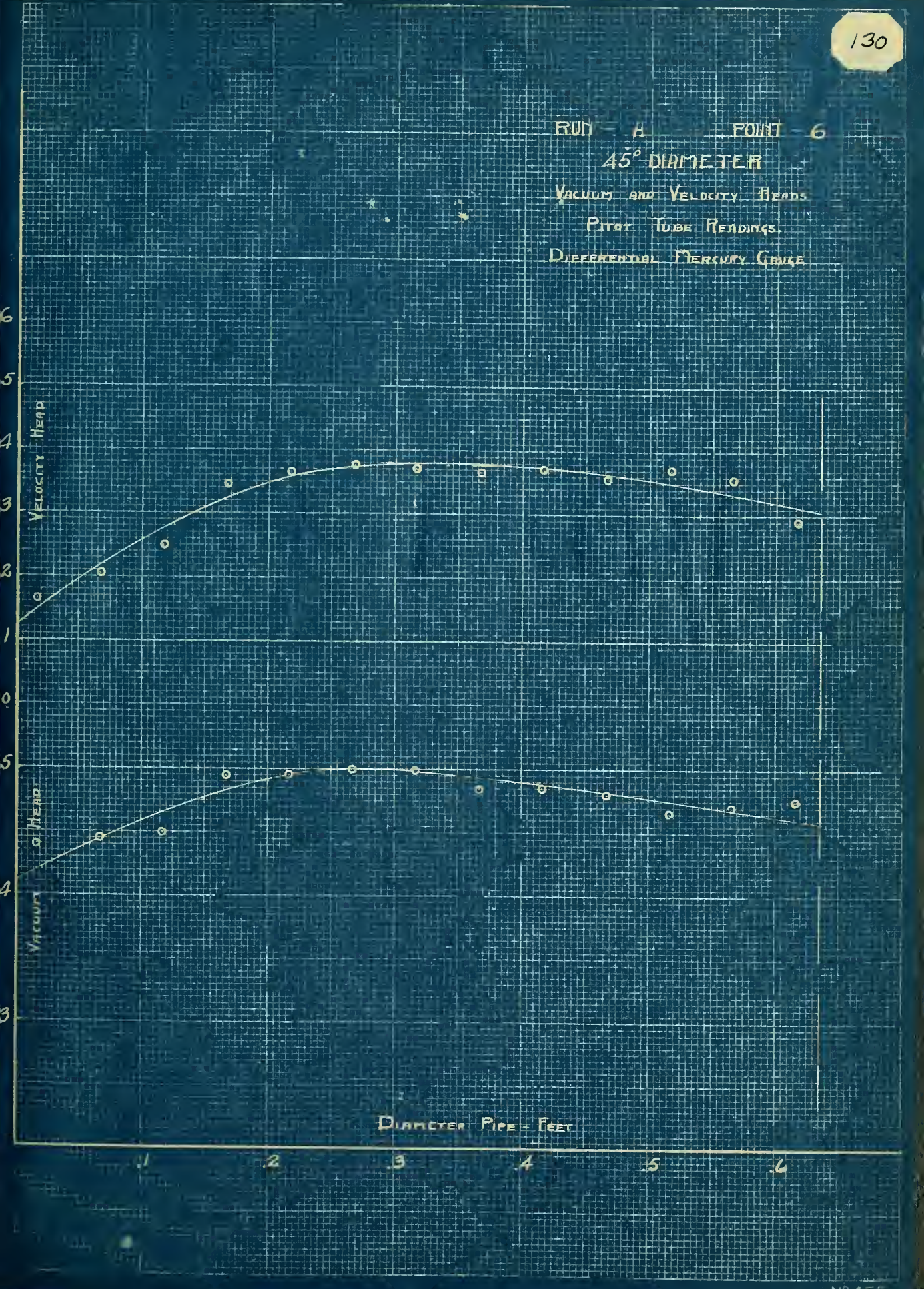
DIFFERENTIAL MERCURY GAUGE

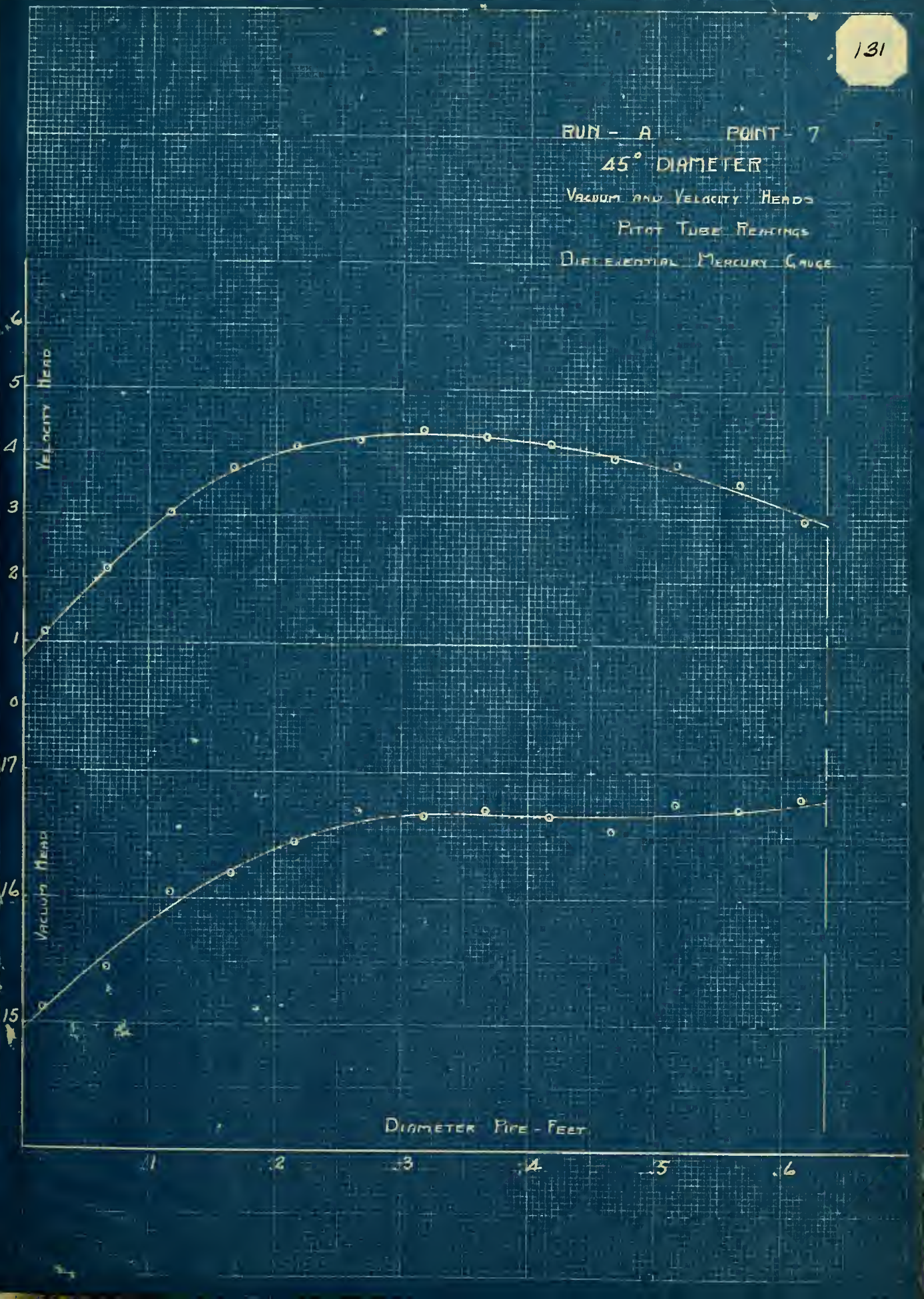


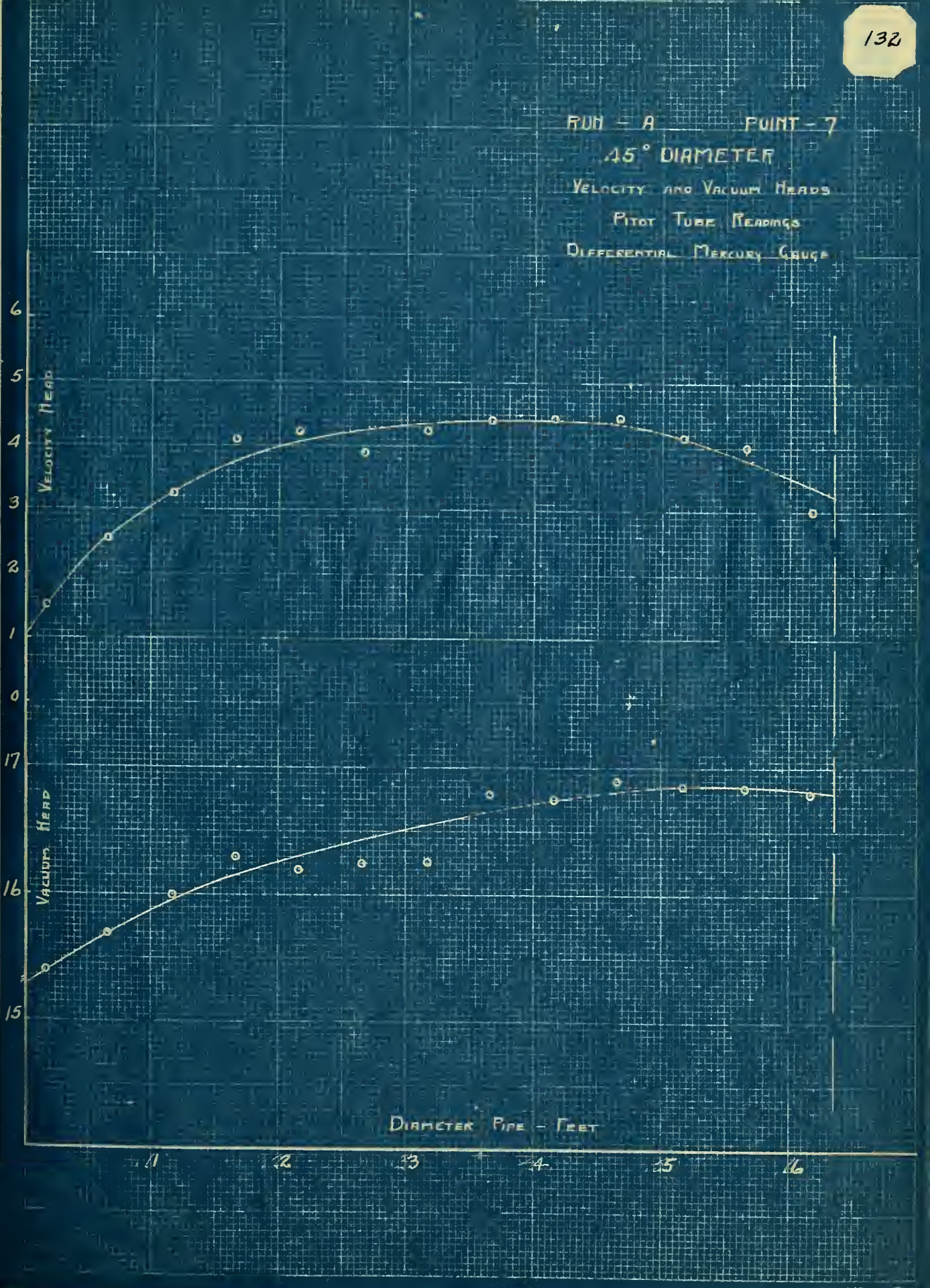

RUN - A POINT - 5
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE
6
5
4
3
2
1
0
4
3
2
1
2
3
4
5

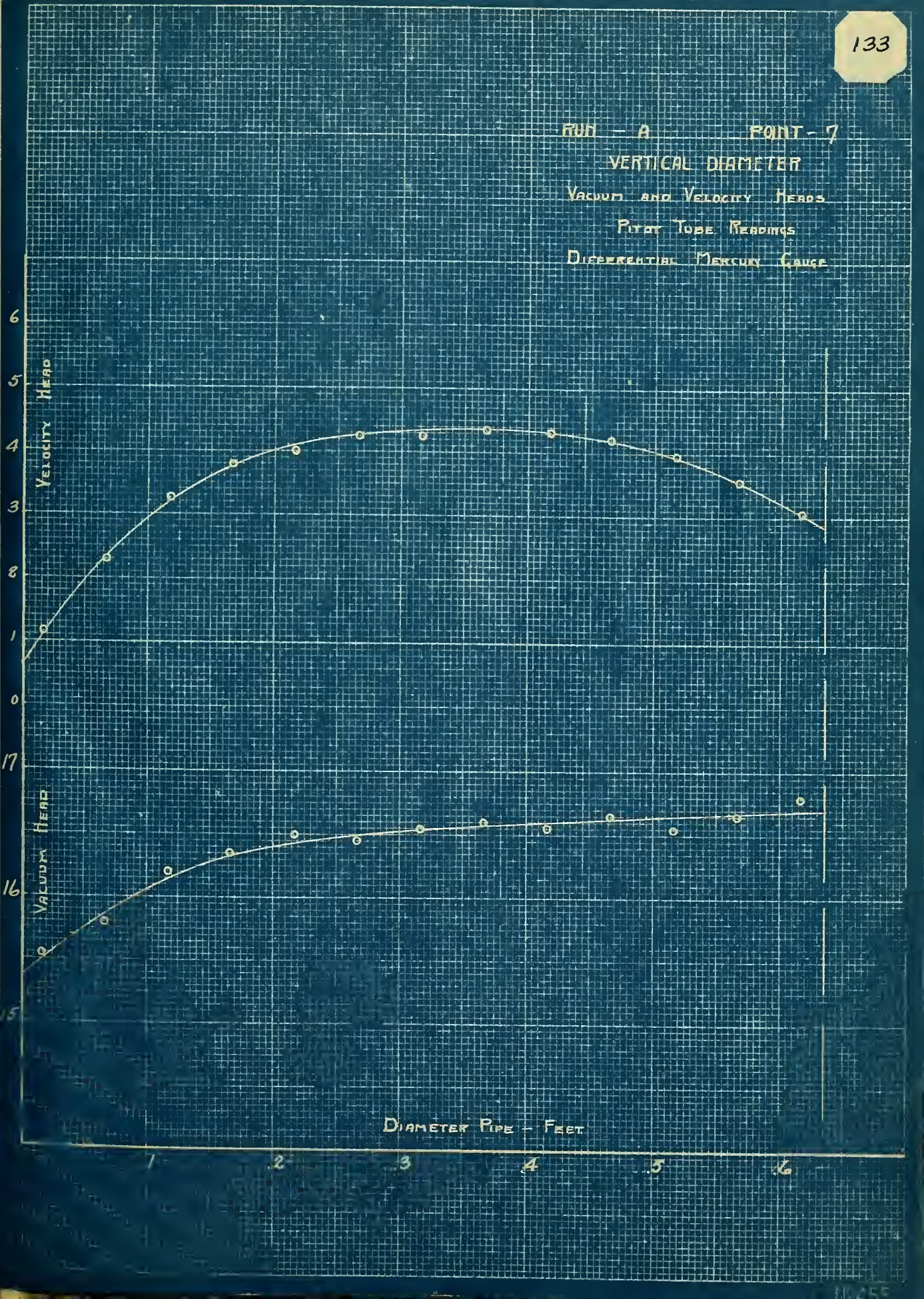

RUN - A POINT - 6
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
6
5
4
3
2
1
0
.4
.3
.2
DIAMETER PIPE - FEET
.1
.2
.3
.4
.5
.6

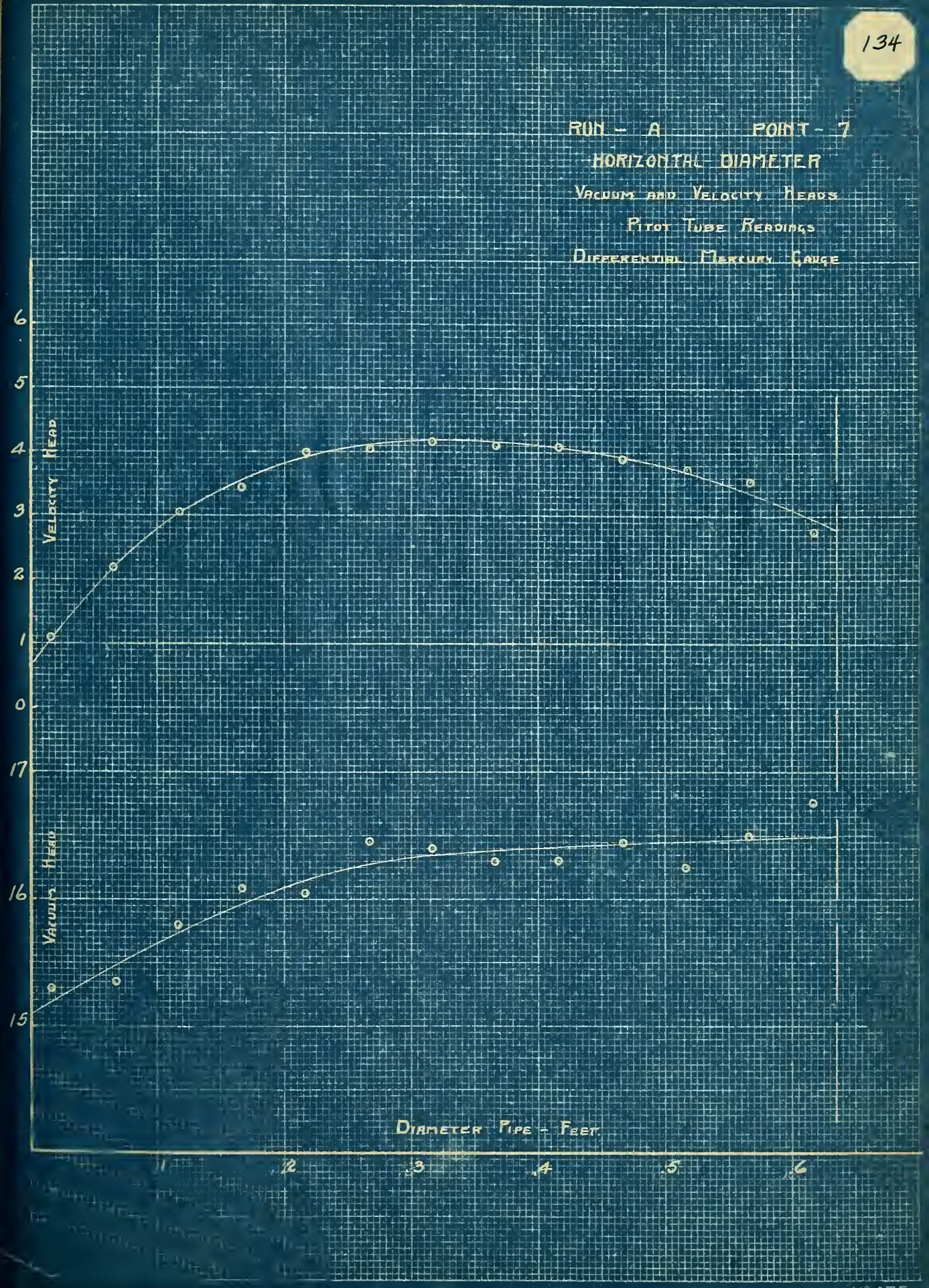

RUN - A
POINT - 6
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
6
5
4
3
2
1
0
15
14
13
.1
.2
.3
.4
.5
.6

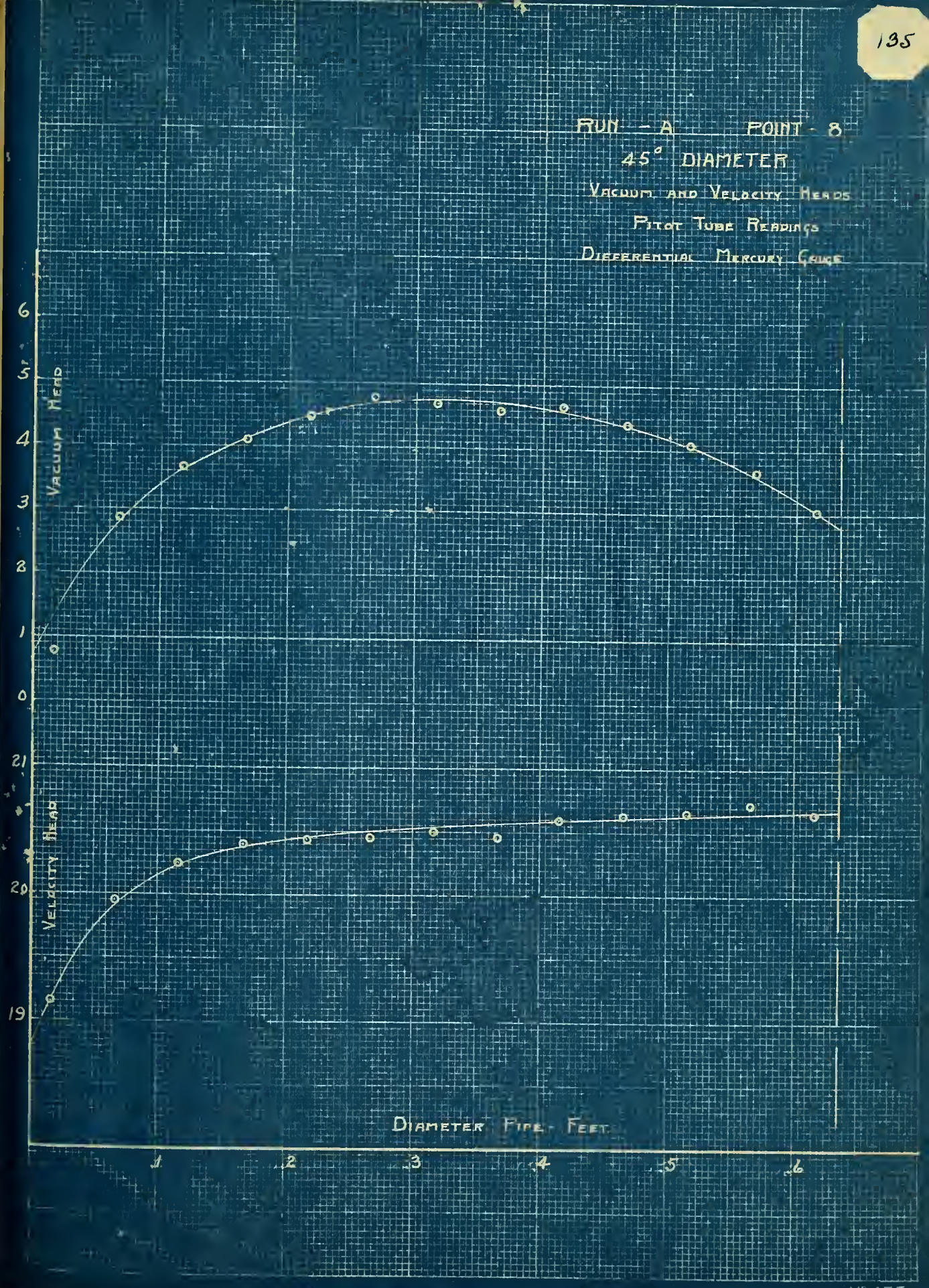

RUN - A POINT - 6
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
.1
.2
.3
.4
.5
.6
6
5
4
3
2
1
0
5
4
3

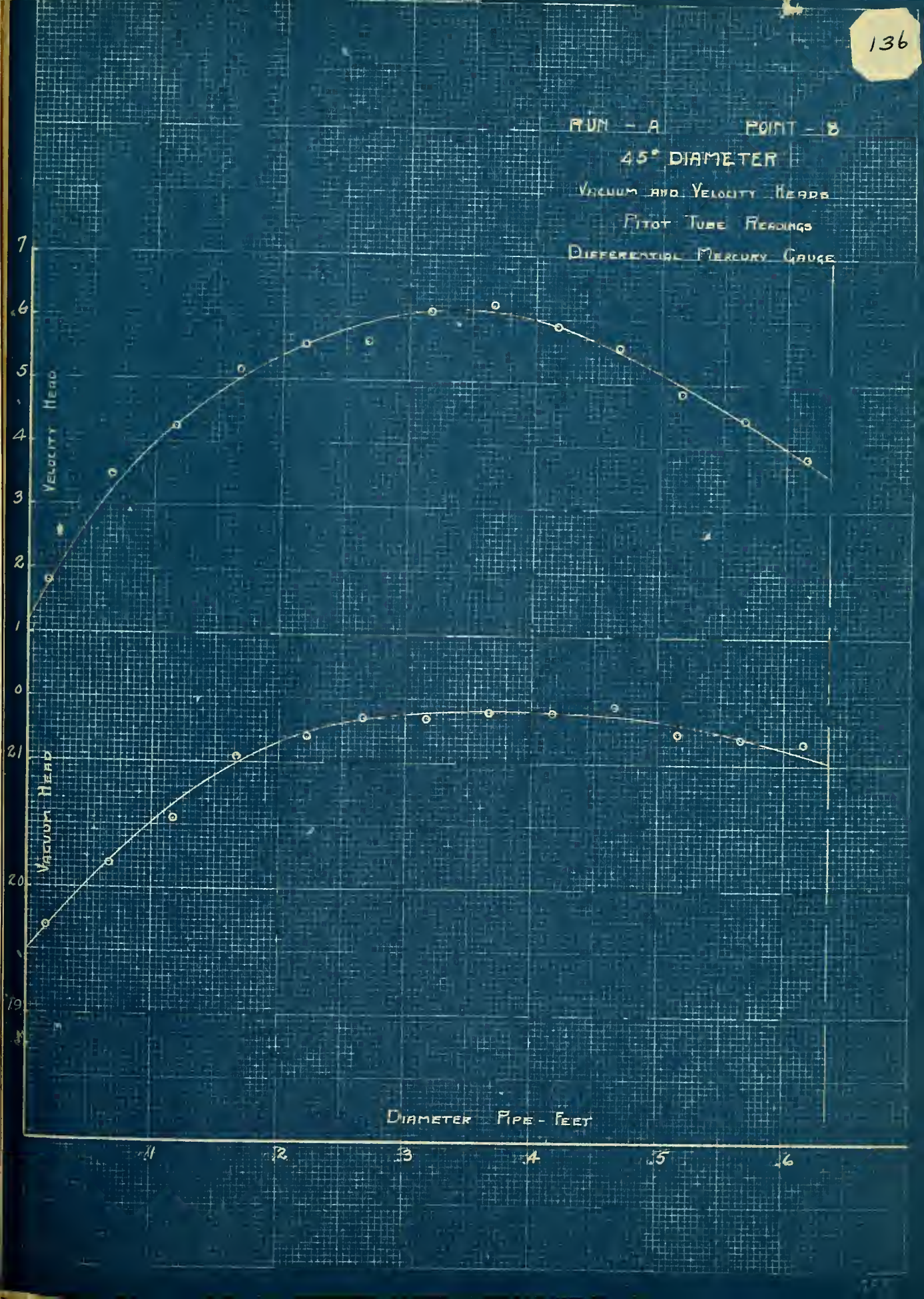

RUN - A POINT - 7
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
.6
5
4
3
2
1
0
17
16
15
.1
.2
.3
.4
.5
.6

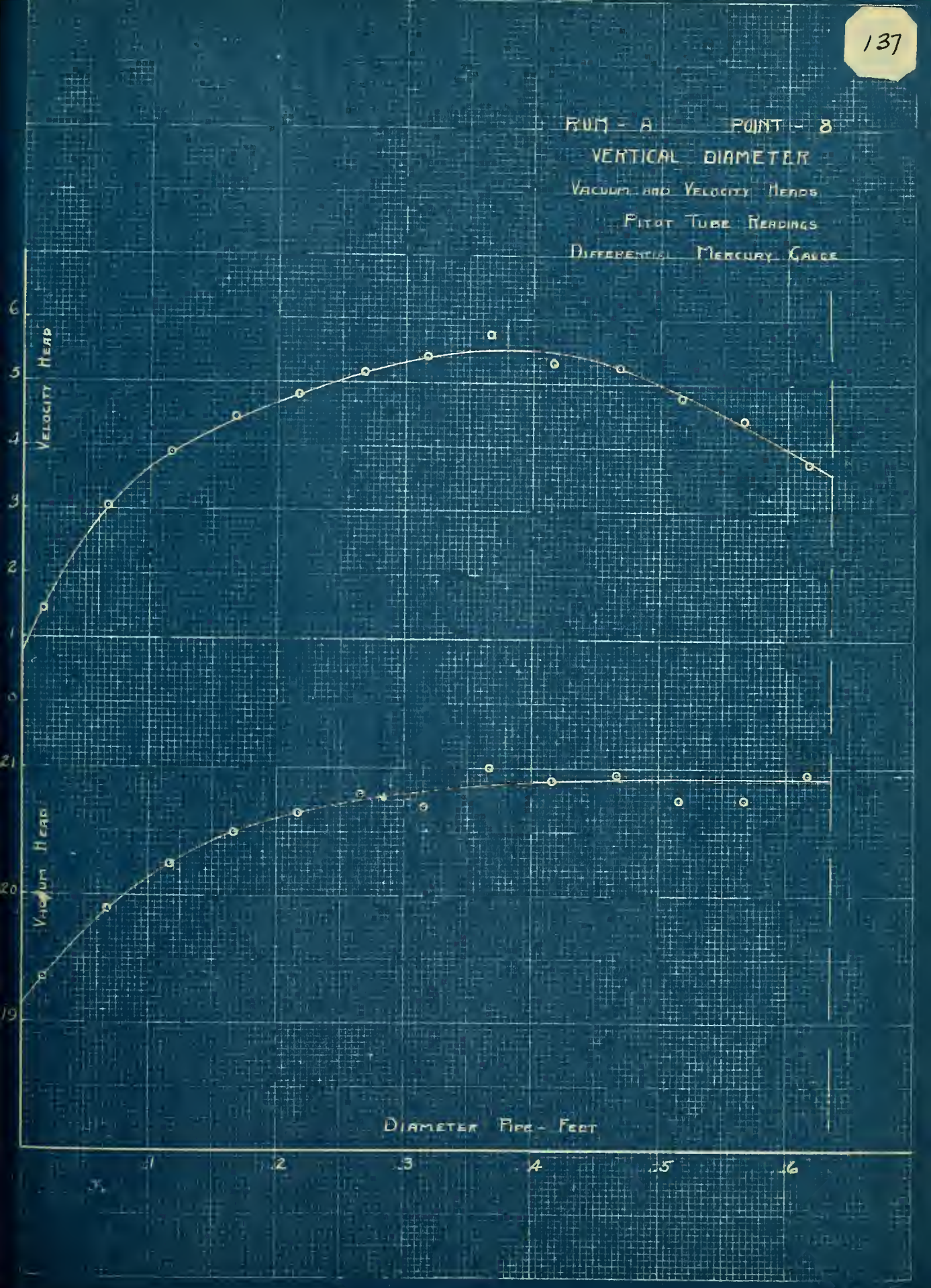

RUN - A POINT - 7
45° DIAMETER
VELOCITY AND VACUUM HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
6
5
4
3
2
1
0
17
16
15
11
12
13
14
15
16

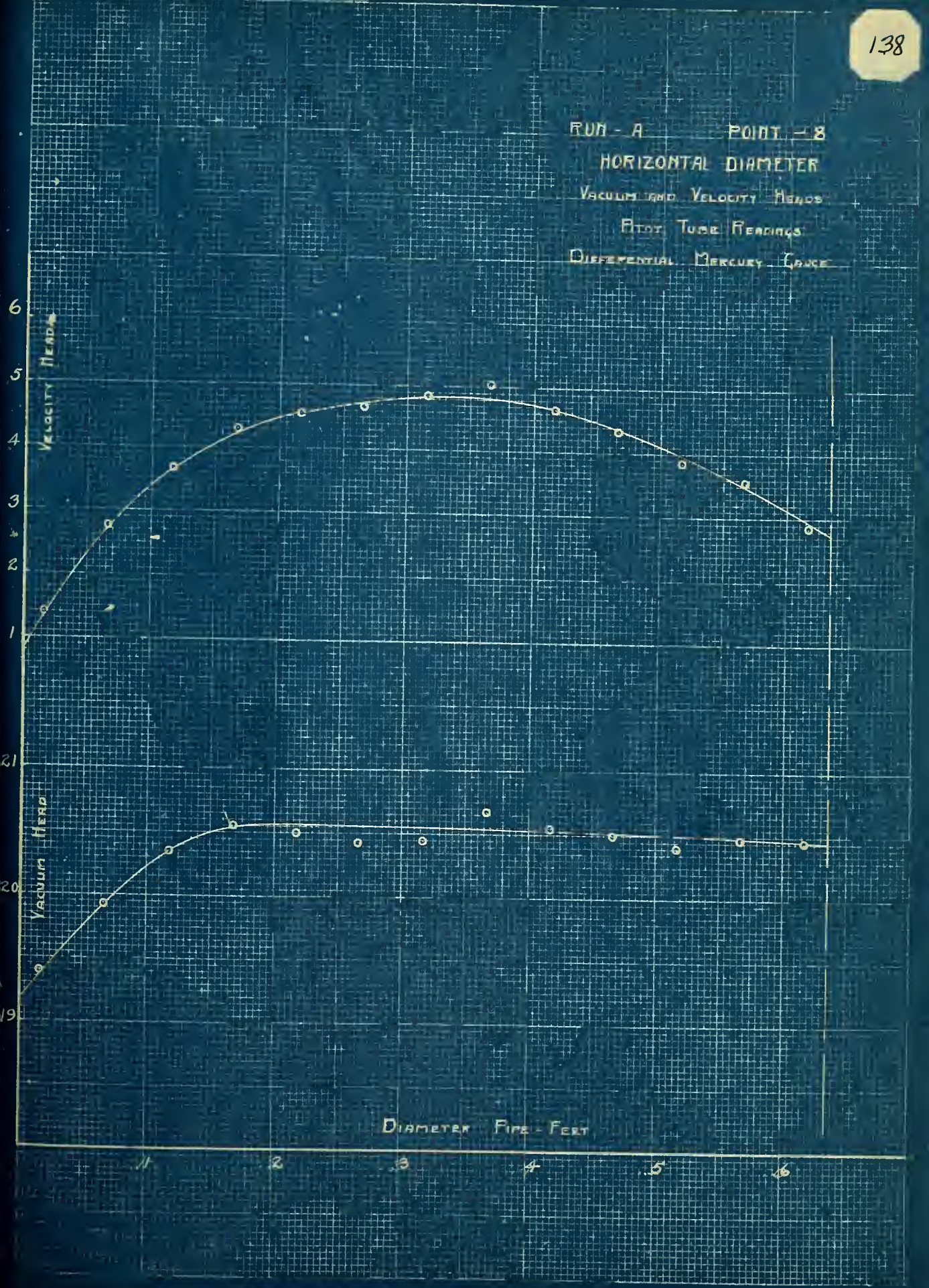

RUN - A POINT - 7
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
6
5
4
3
8
1
0
17
16
15
1
.2
.3
.4
.5
.6

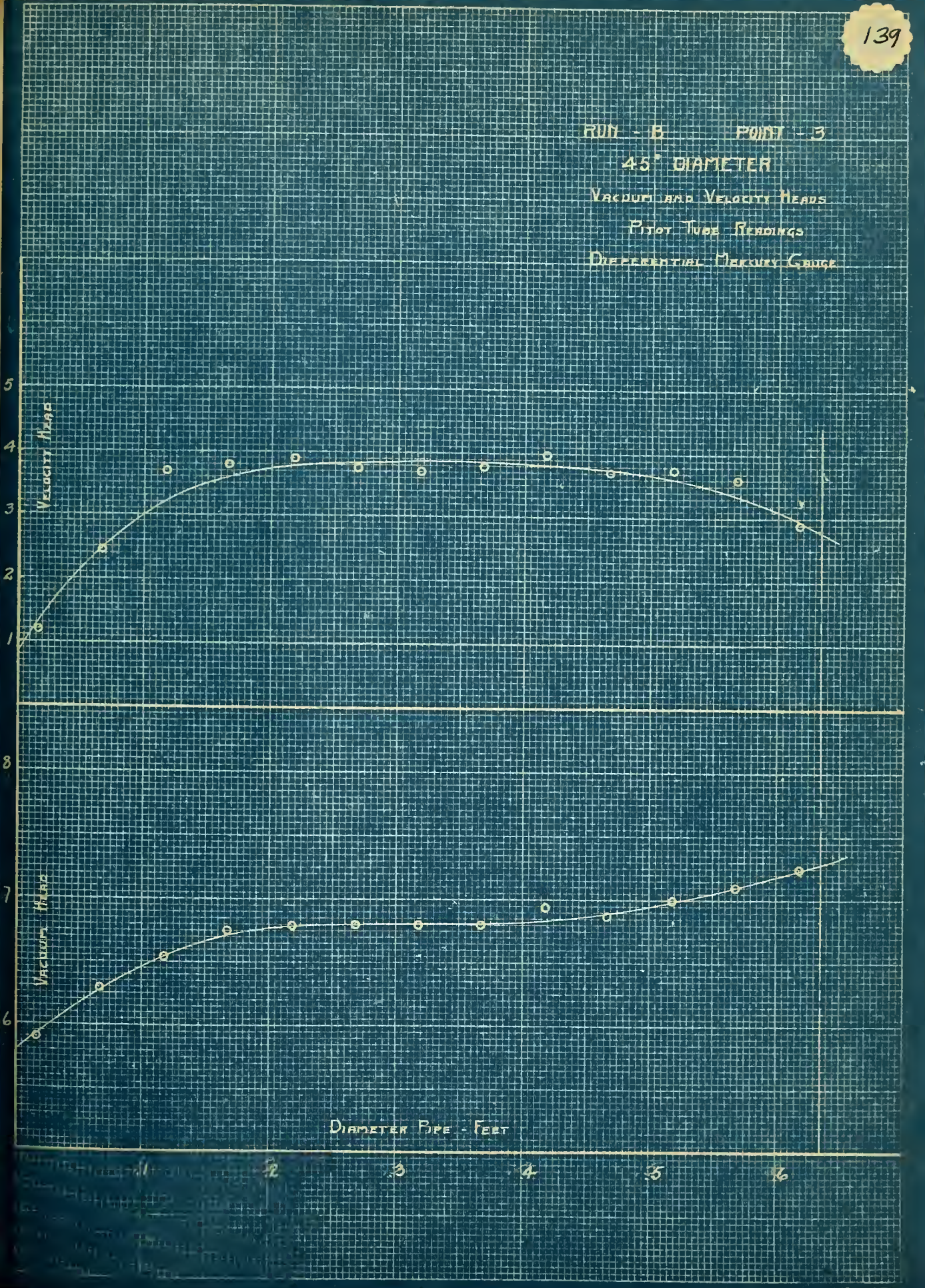

RUN - A POINT - 7
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
6
5
4
3
2
1
0
17
16
15
DIAMETER PIPE - FEET
.1
.2
.3
.4
.5
.6

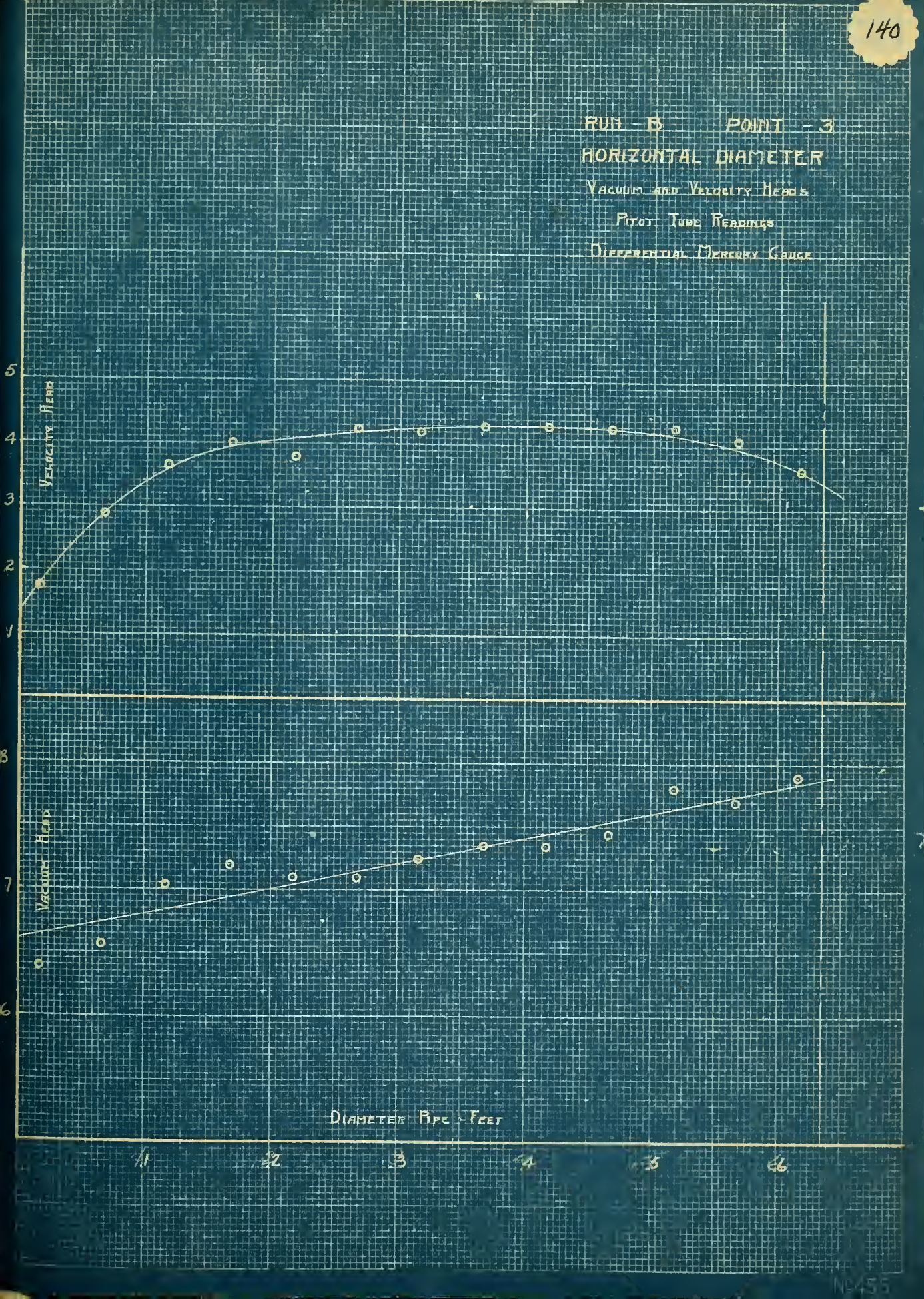

RUN - A POINT - 8
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
6
5
4
3
2
1
0
21
20
19
.1
.2
.3
.4
.5
.6

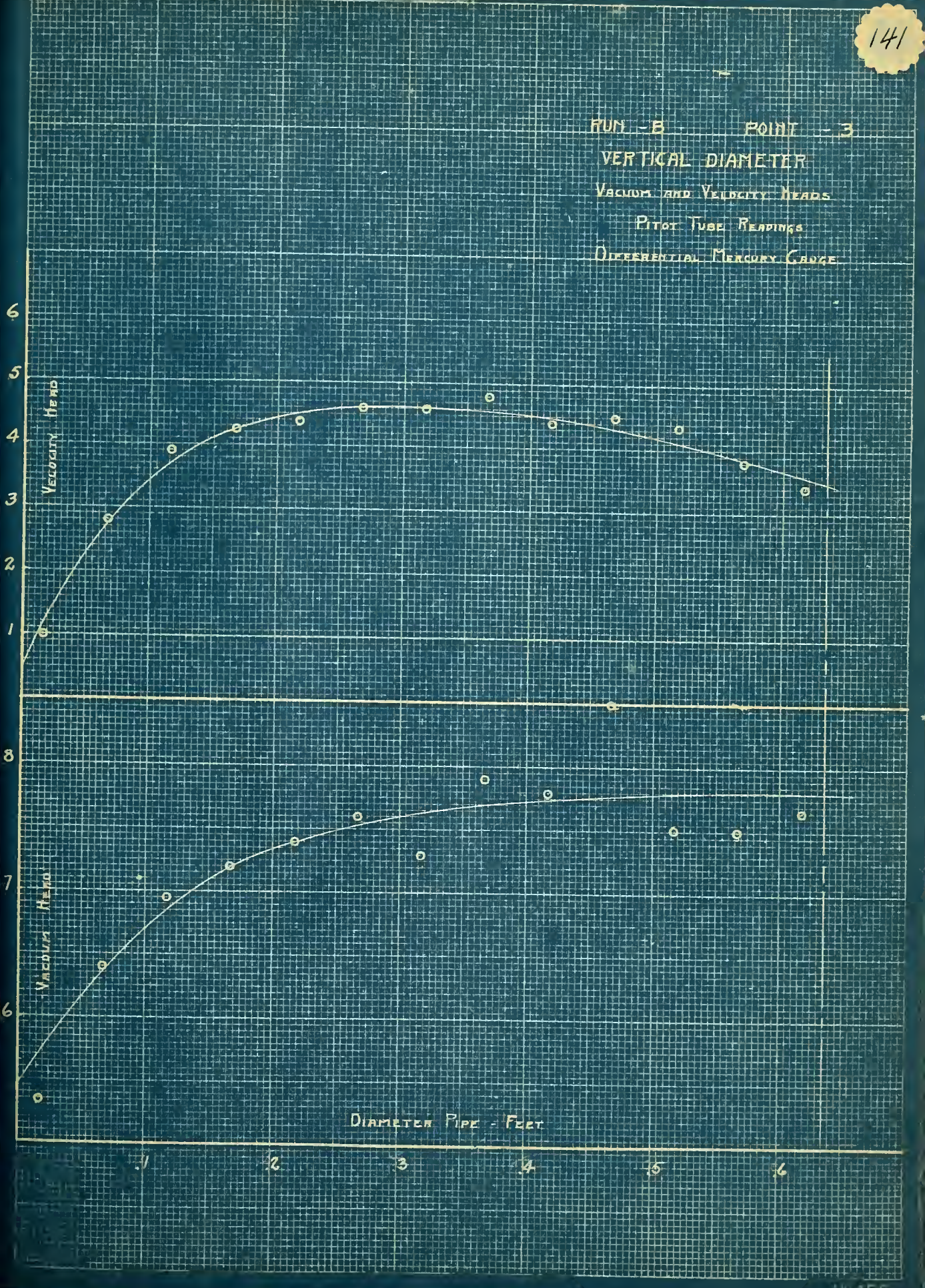

RUN - A POINT - B
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
7
6
5
4
3
2
1
0
.21
.20
.19
.1
.2
.3
.4
.5
.6

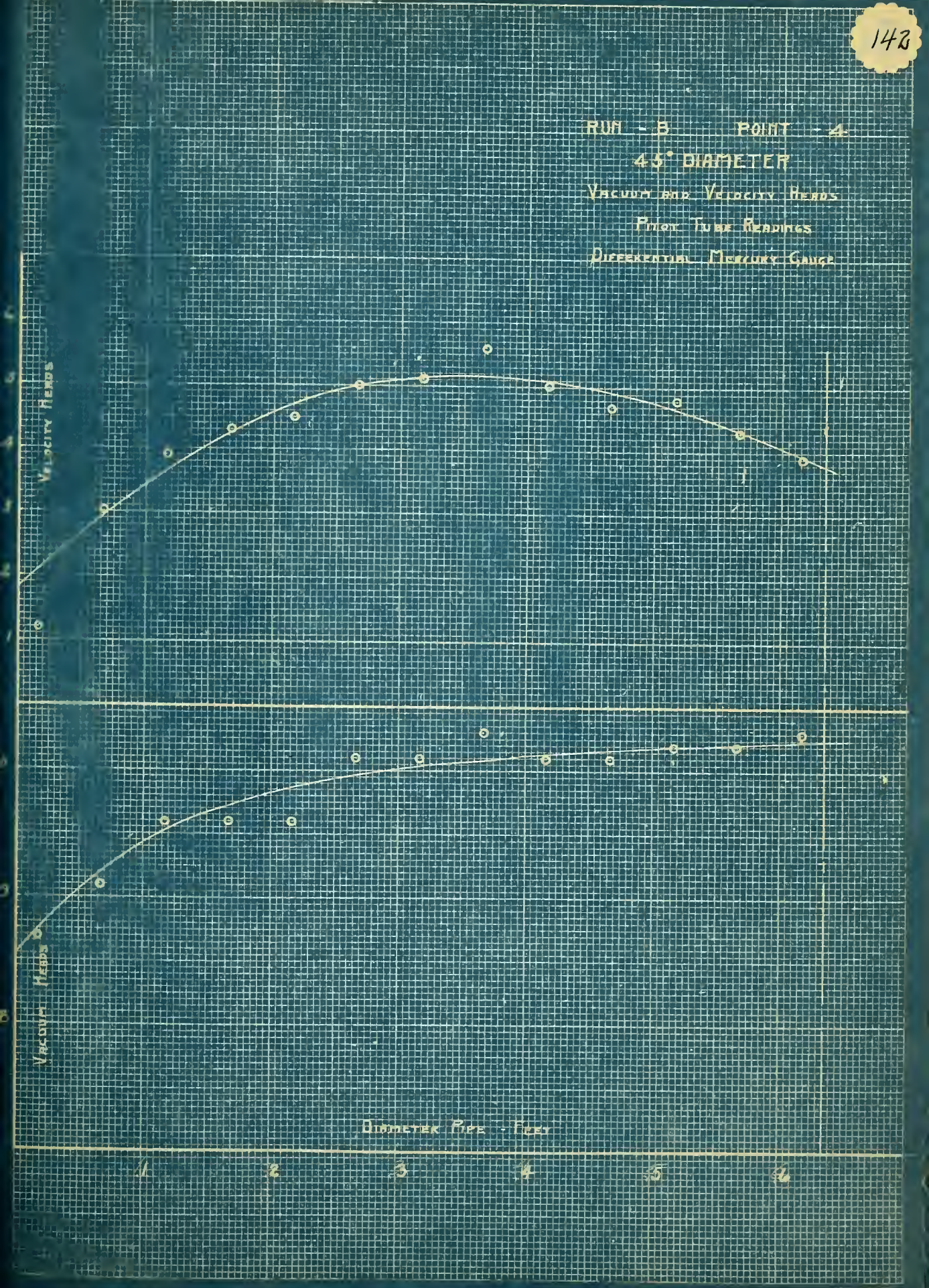

RUN - A POINT - 8
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
6
5
4
3
2
1
0
.21
.20
.19
.1
.2
.3
.4
.5
.6


RUN - A POINT - 8
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEADS
VACUUM HEAD
DIAMETER FIRE - FEET
6
5
4
3
2
1
.21
.20
.19
.1
.2
.3
.4
.5
.6


RUN - B POINT - 3
45" DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
1
2
3
4
5
6
7
8
.1
.2
.3
.4
.5
.6


RUN - B POINT - 3
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
5
4
3
2
1
8
7
6
1
2
3
4
5
6


RUN - B POINT - 3
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
1
2
3
4
5
6
7
8
.1
.2
.3
.4
.5
.6


RUN - B POINT - 4
45" DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEADS
VACUUM HEADS
DIAMETER PIPE - FEET
1
2
3
4
5
6

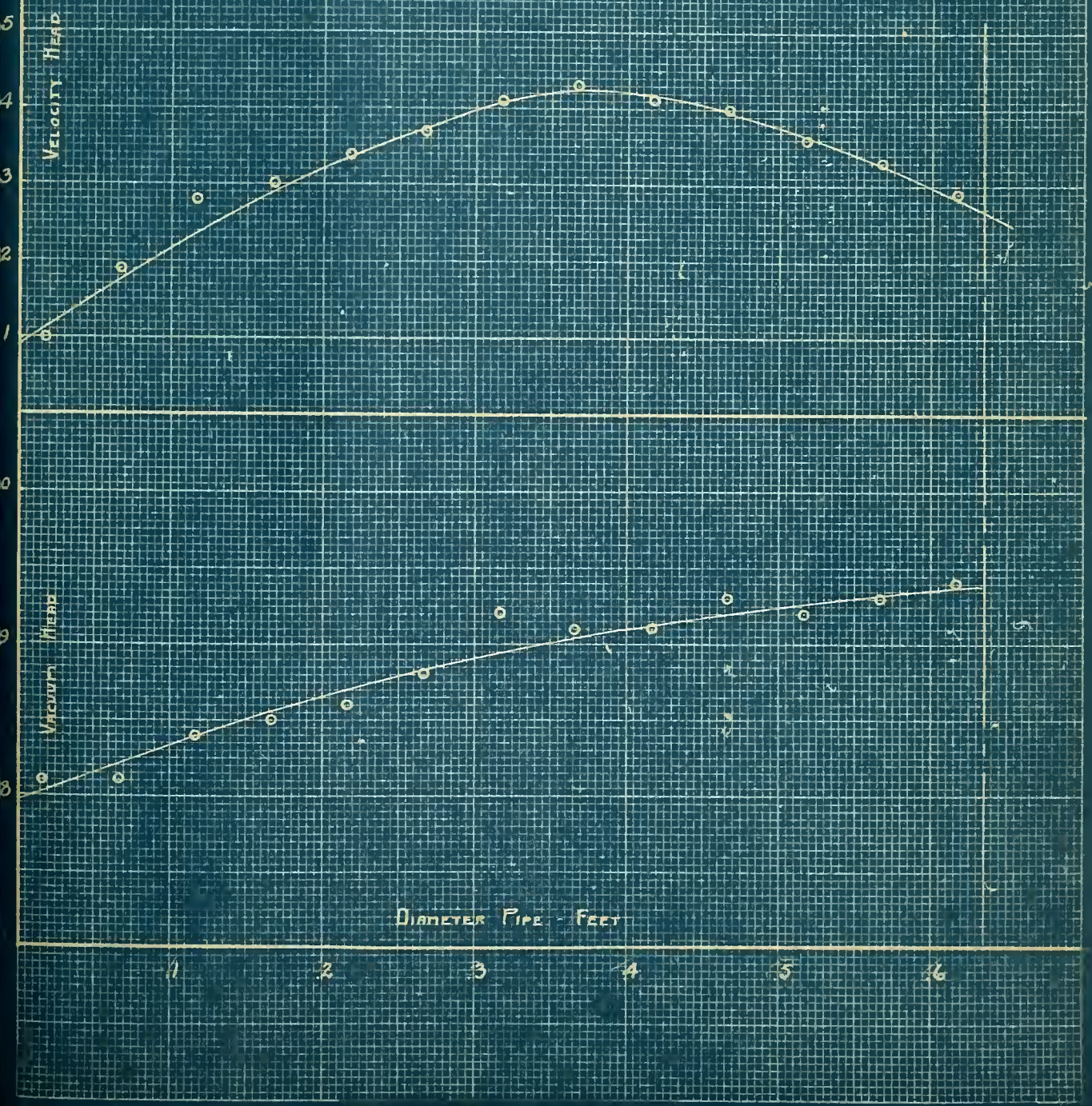
RUN - B POINT - 4

VERTICAL DIAMETER

VACUUM AND VELOCITY HEADS

PITOT TUBE READINGS

DIFFERENTIAL MERCURY GAUGE



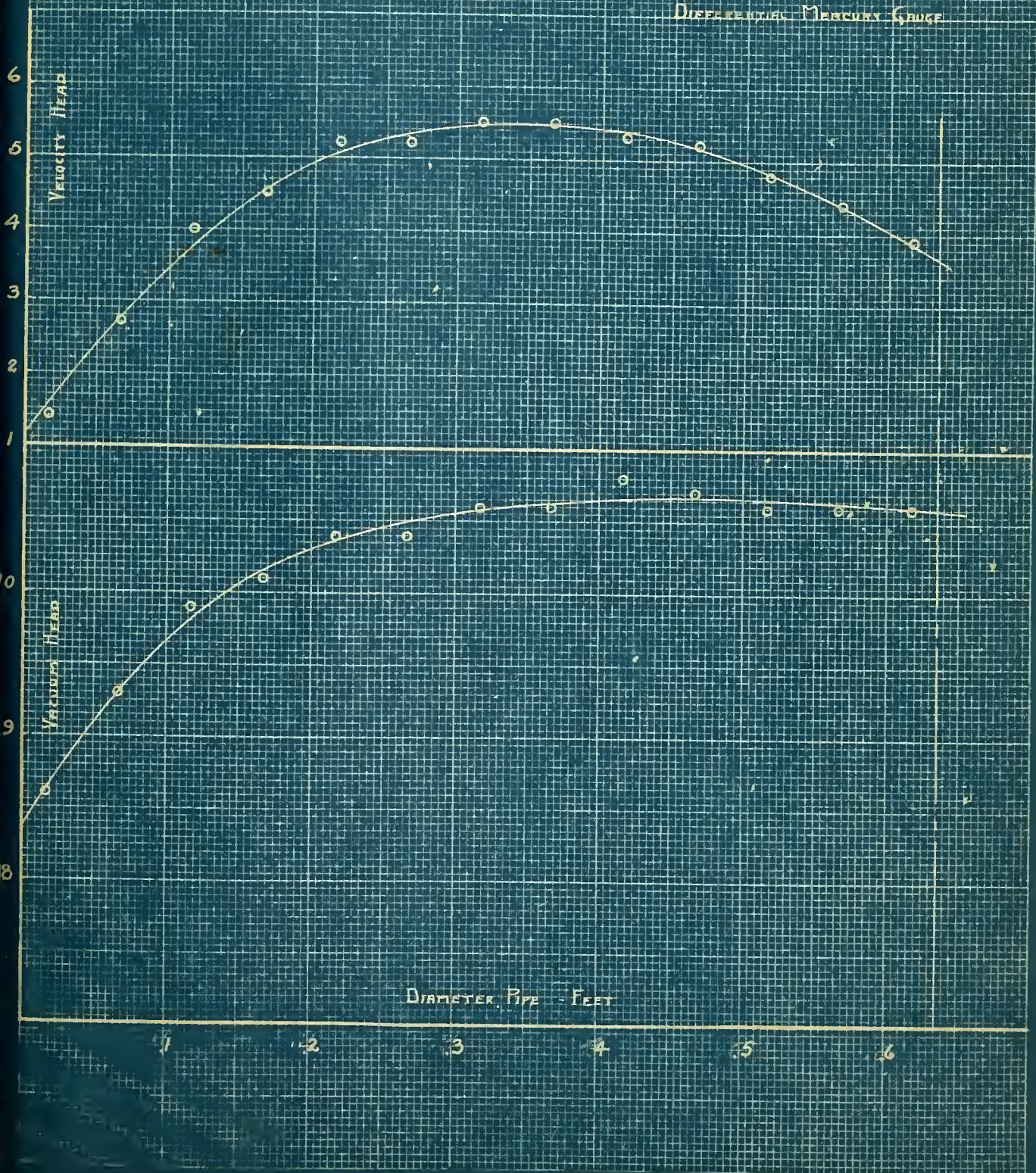
RUN - B POINT - 4

HORIZONTAL DIAMETER

VACUUM AND VELOCITY HEADS

PITOT TUBE READINGS

DIFFERENTIAL MERCURY GAUGE



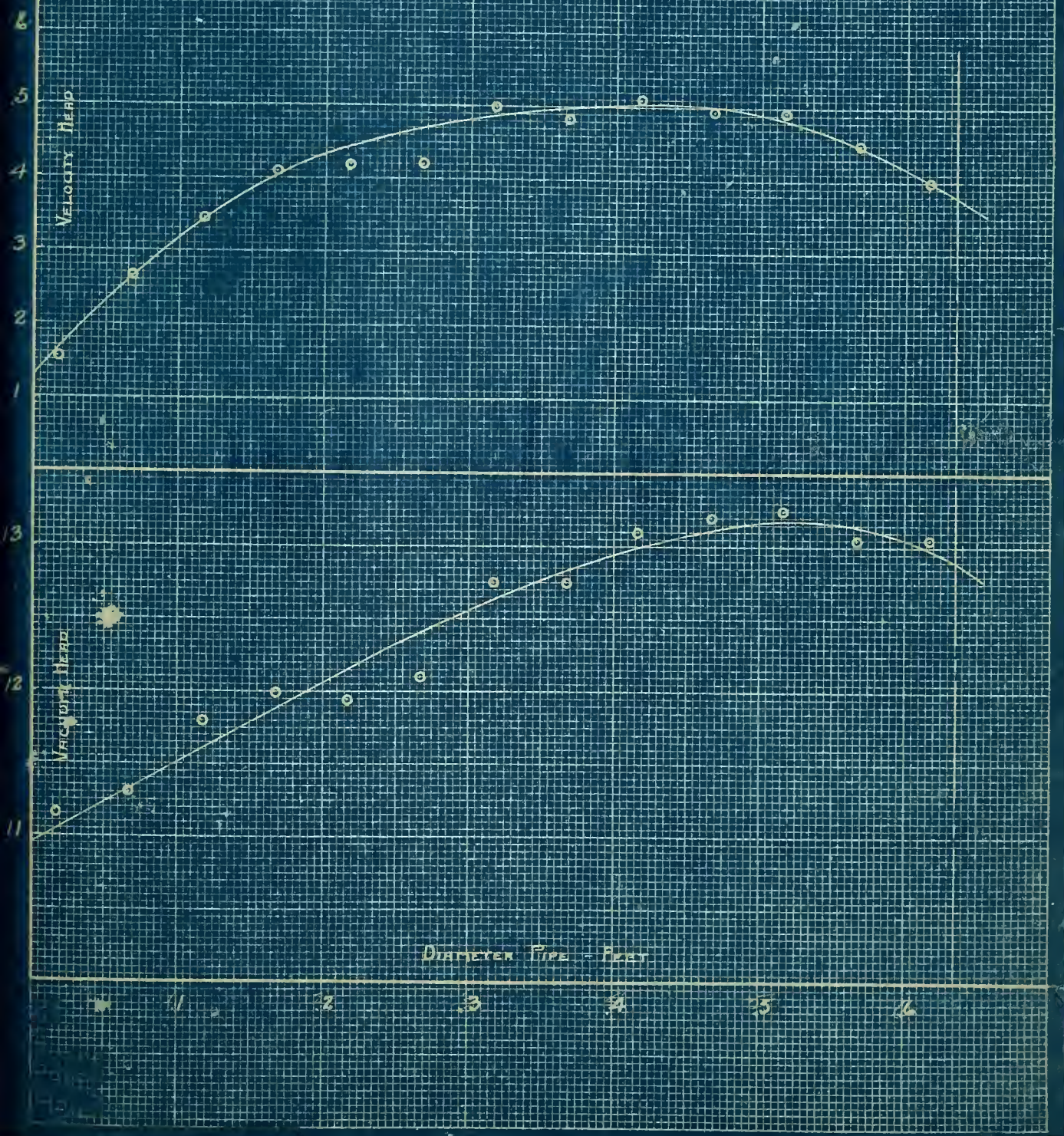
RUN "B" POINT - 5

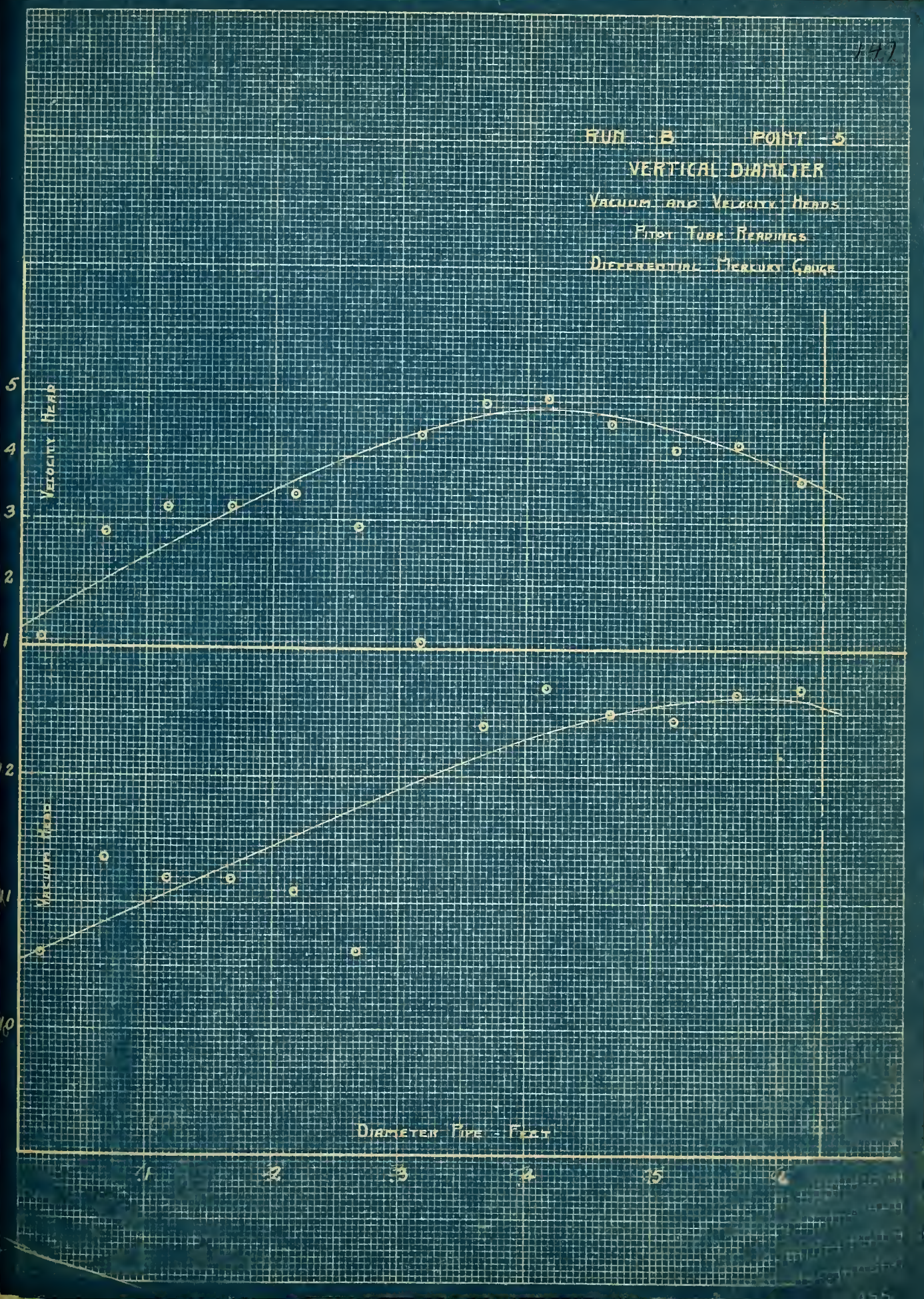
4.5' DIAMETER

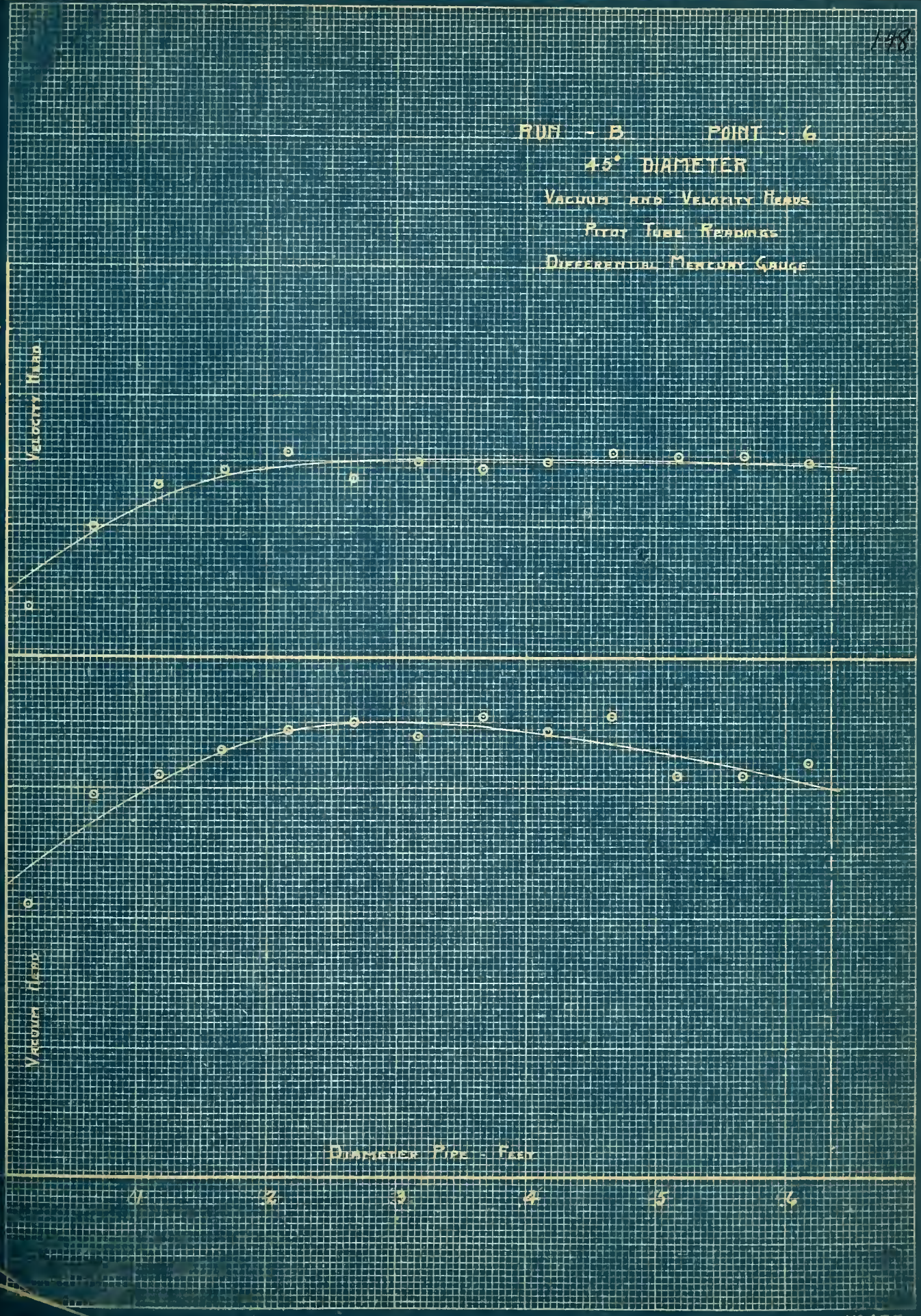
VACUUM AND VELOCITY HEADS

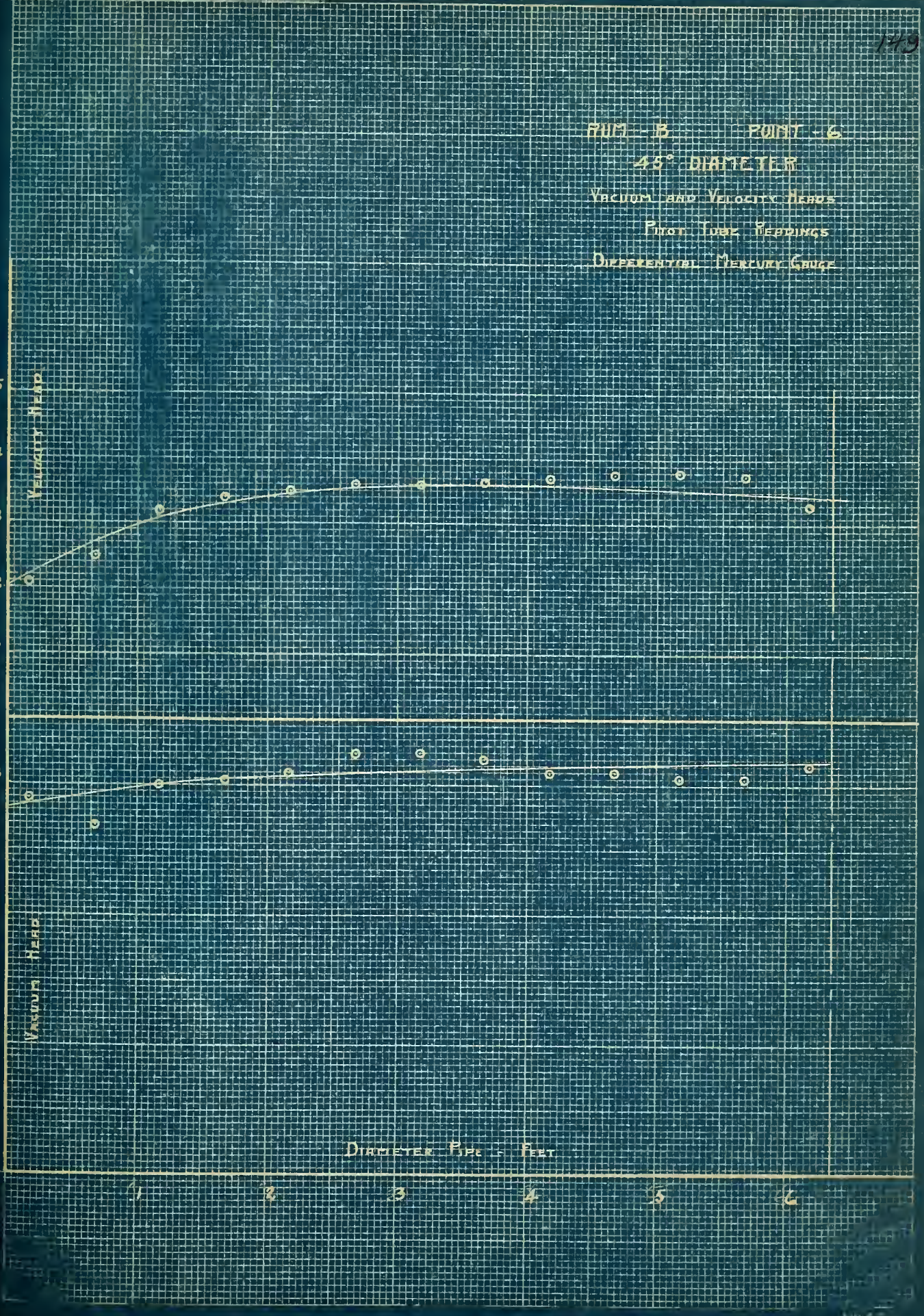
PITOT TUBE READINGS

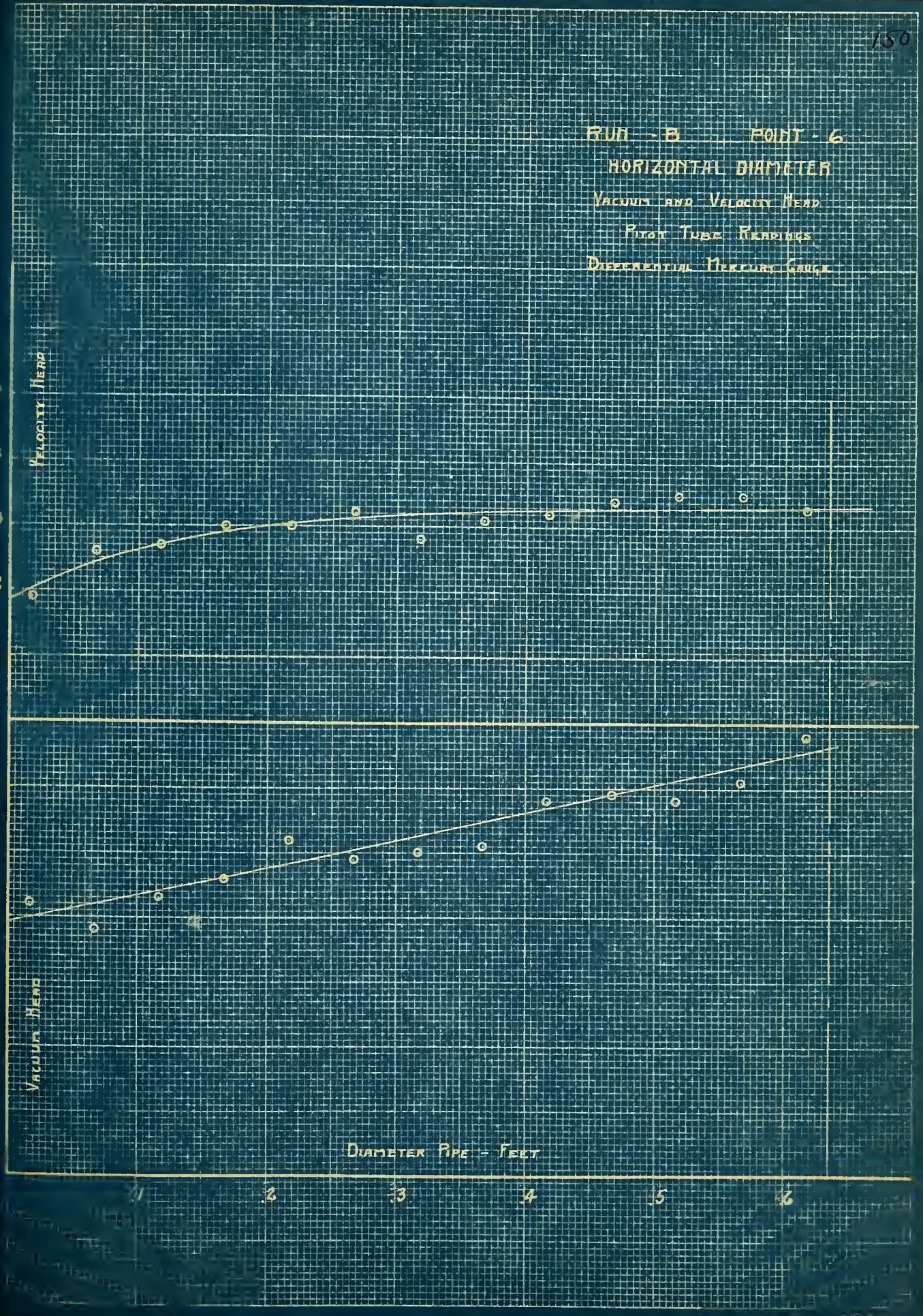
DIFFERENTIAL MERCURY GAUGE

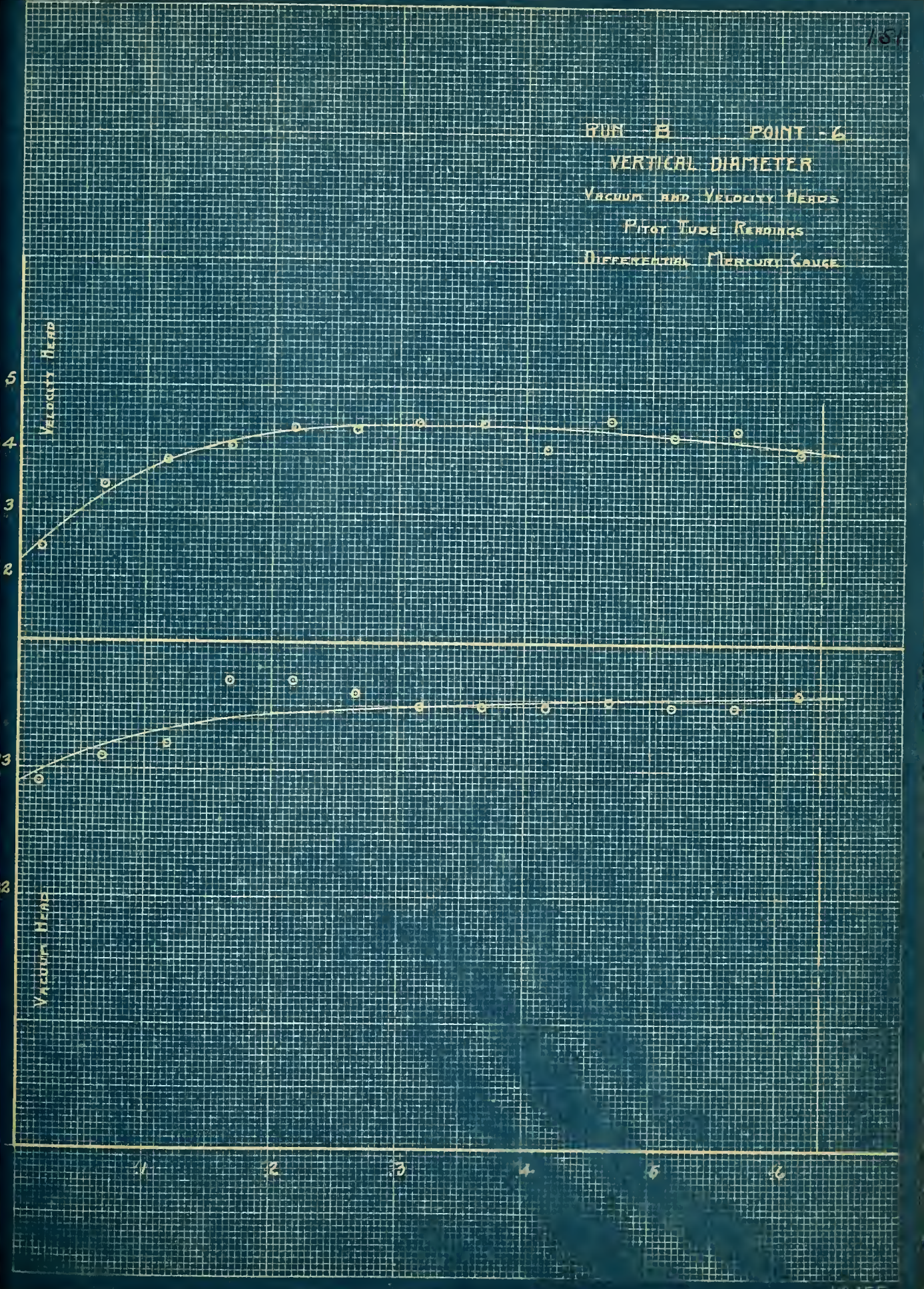


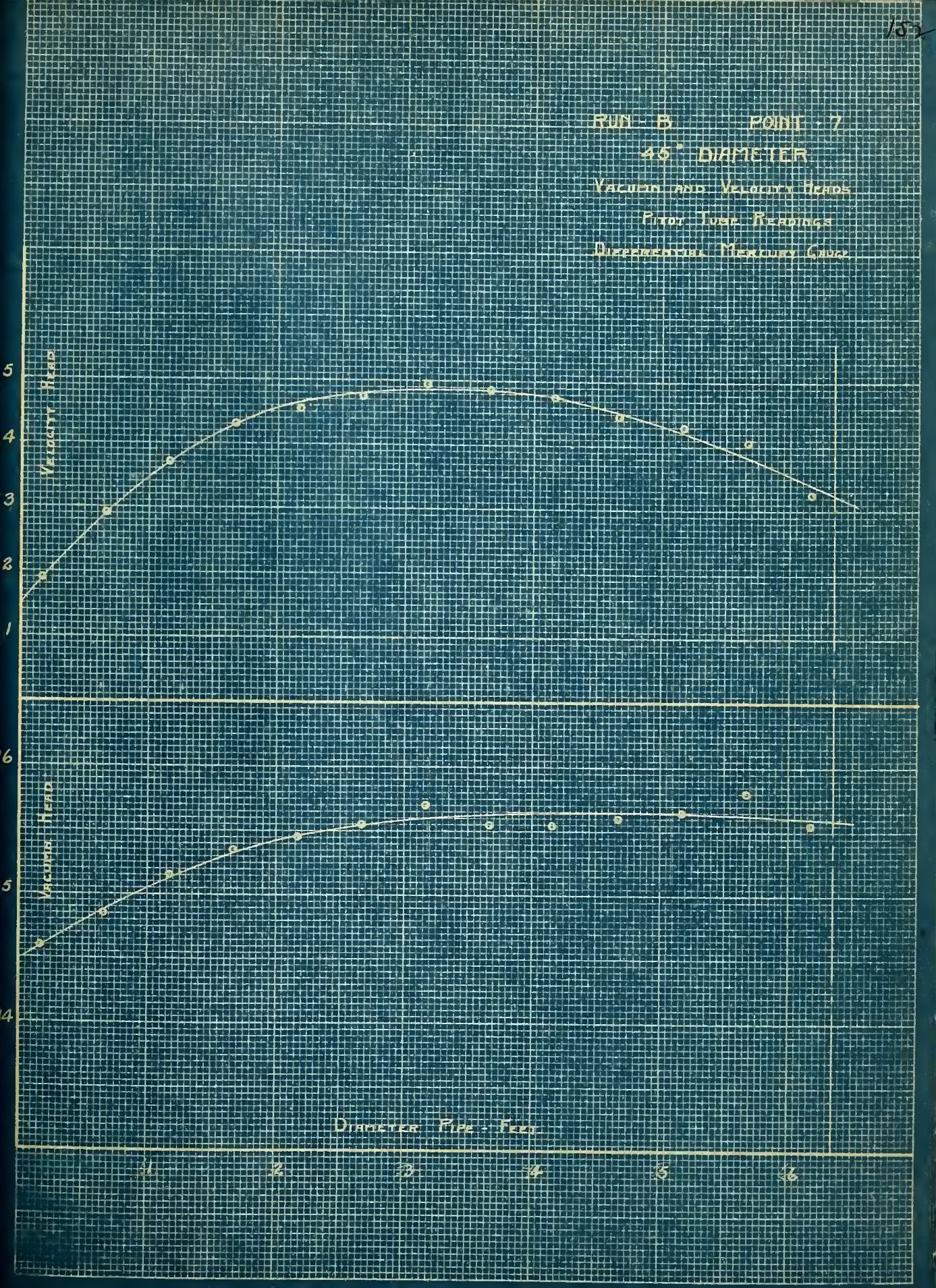

RUN B POINT 5
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE : FEET
5
4
3
2
1
2
11
10
.1
.2
.3
.4
.5
.6

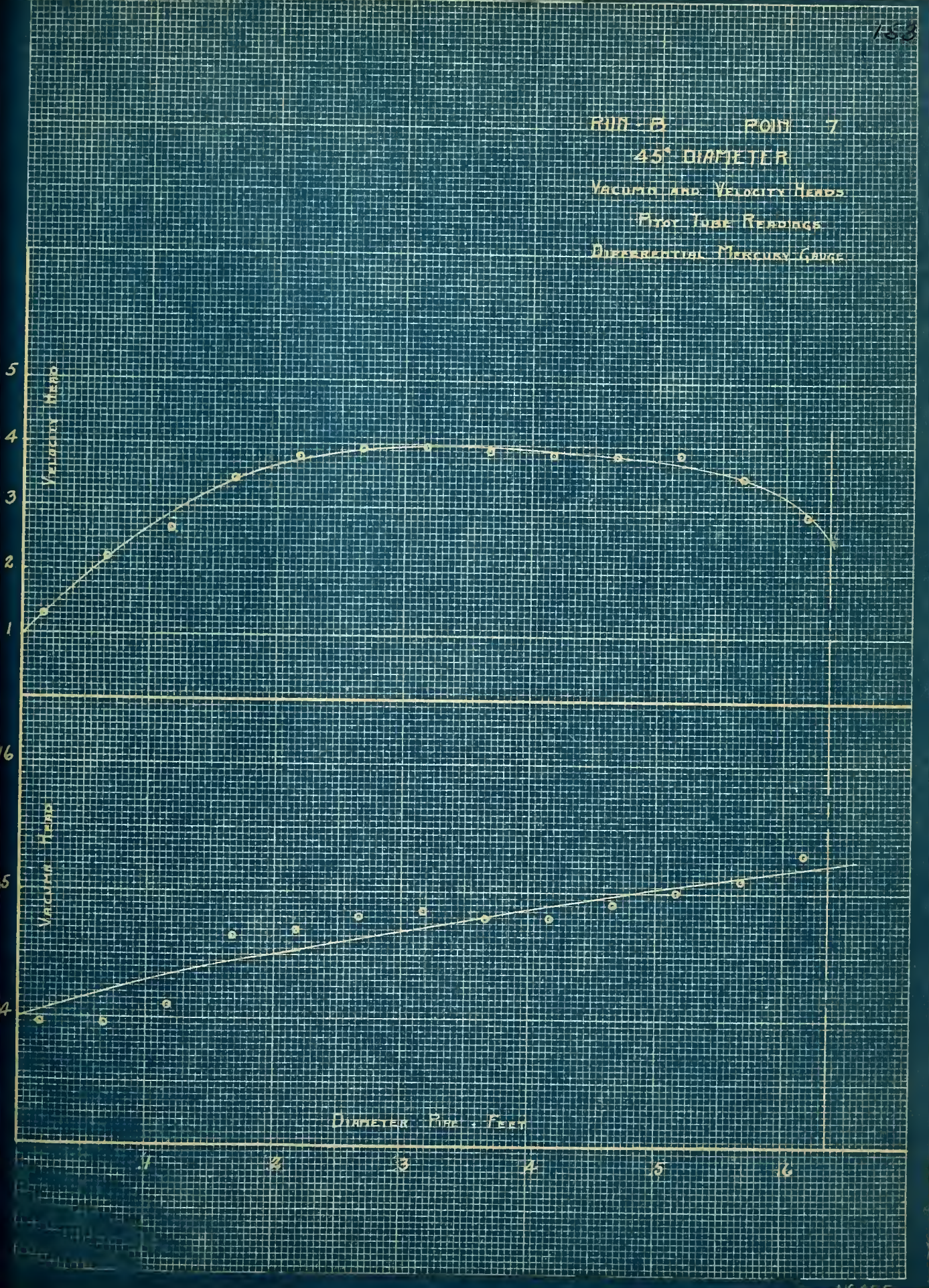

RUN - B POINT - 6
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
6
5
4
3
2
14
13
12
1
2
3
4
5
6

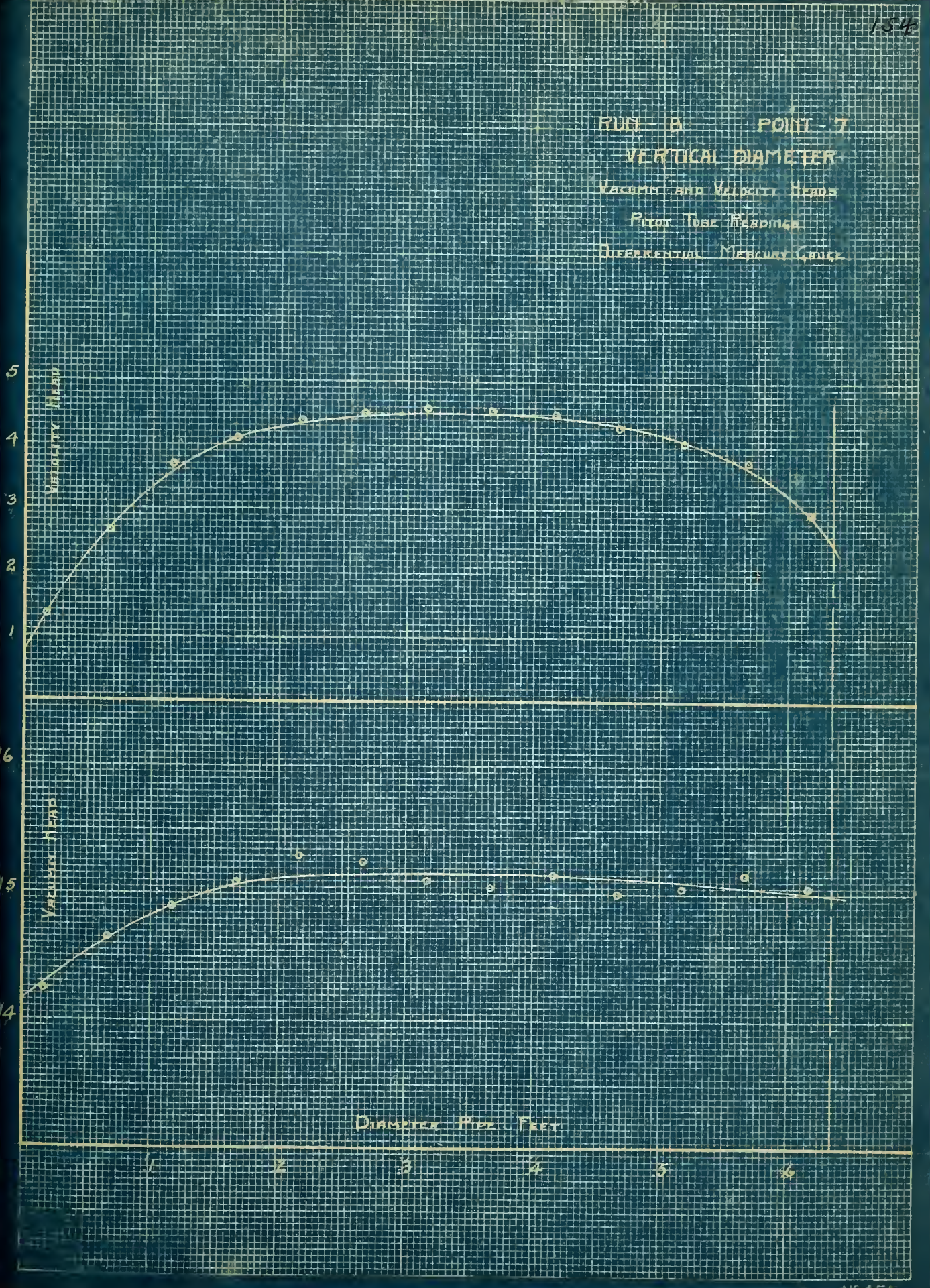

RUN - B POINT - 6
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE IN FEET
5
4
3
2
1
13
12
11
1
2
3
4
5
6


RUN - B POINT - 6
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEAD
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
1
2
3
4
5
6

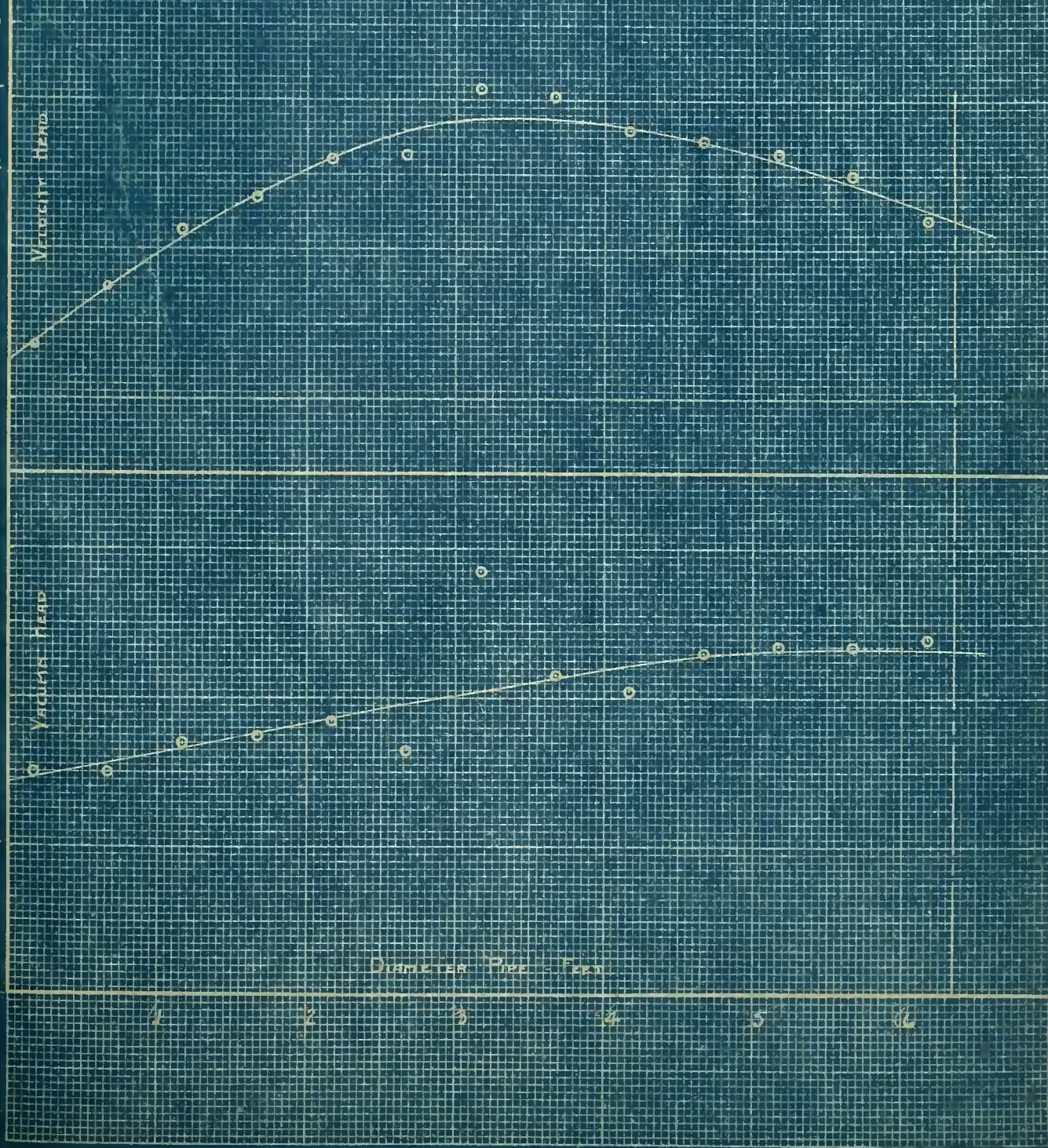

RUN B POINT -6
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
5
4
3
2
3
2
1
2
3
4
5
6

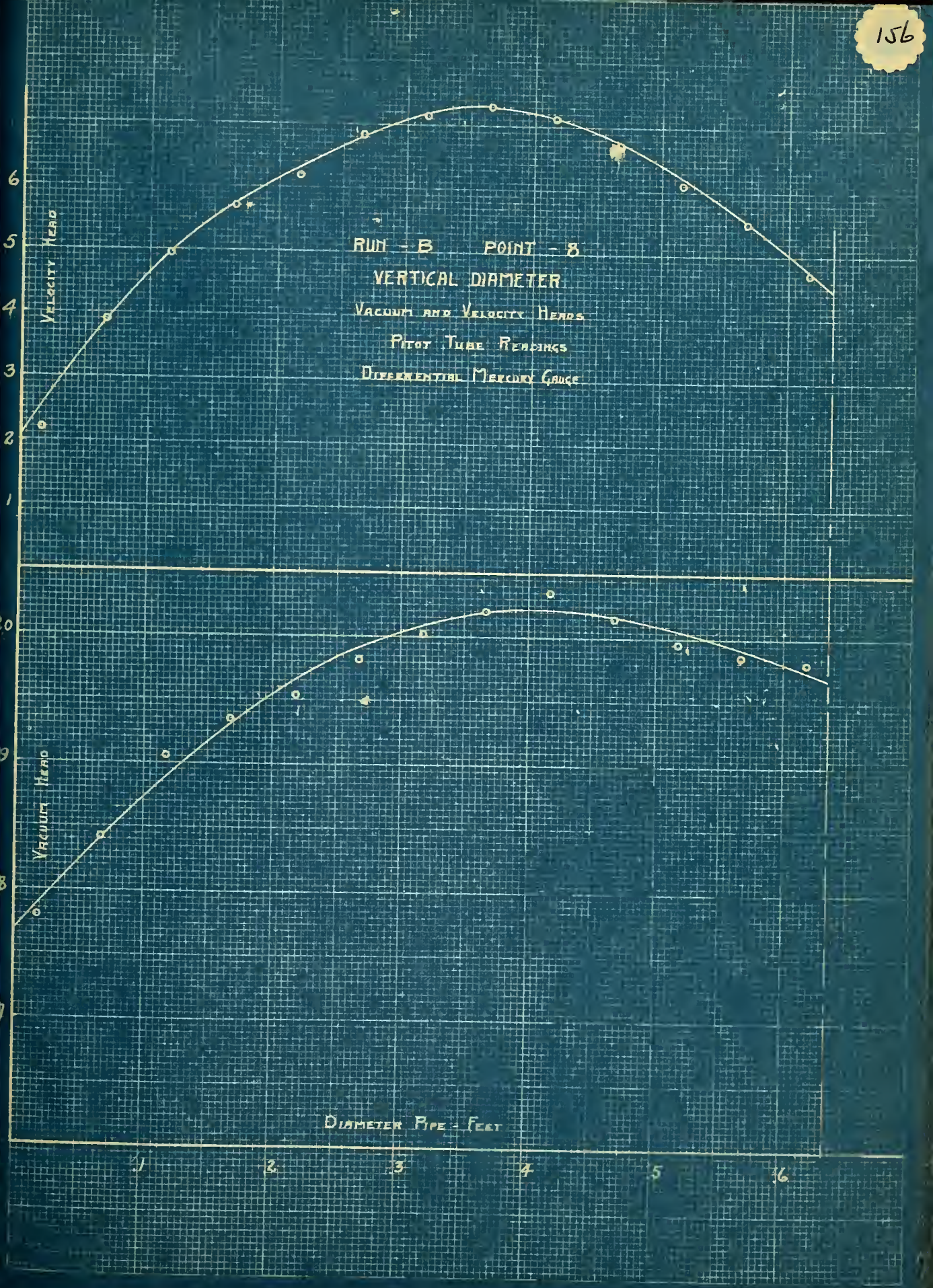

Run B Point 7
45° Diameter
Vacuum and Velocity Heads
Pitot Tube Readings
Differential Mercury Gauge
Velocity Head
5
4
3
2
1
Vacuum Head
6
5
4
Diameter Pipe = Feet
1
2
3
4
5
6

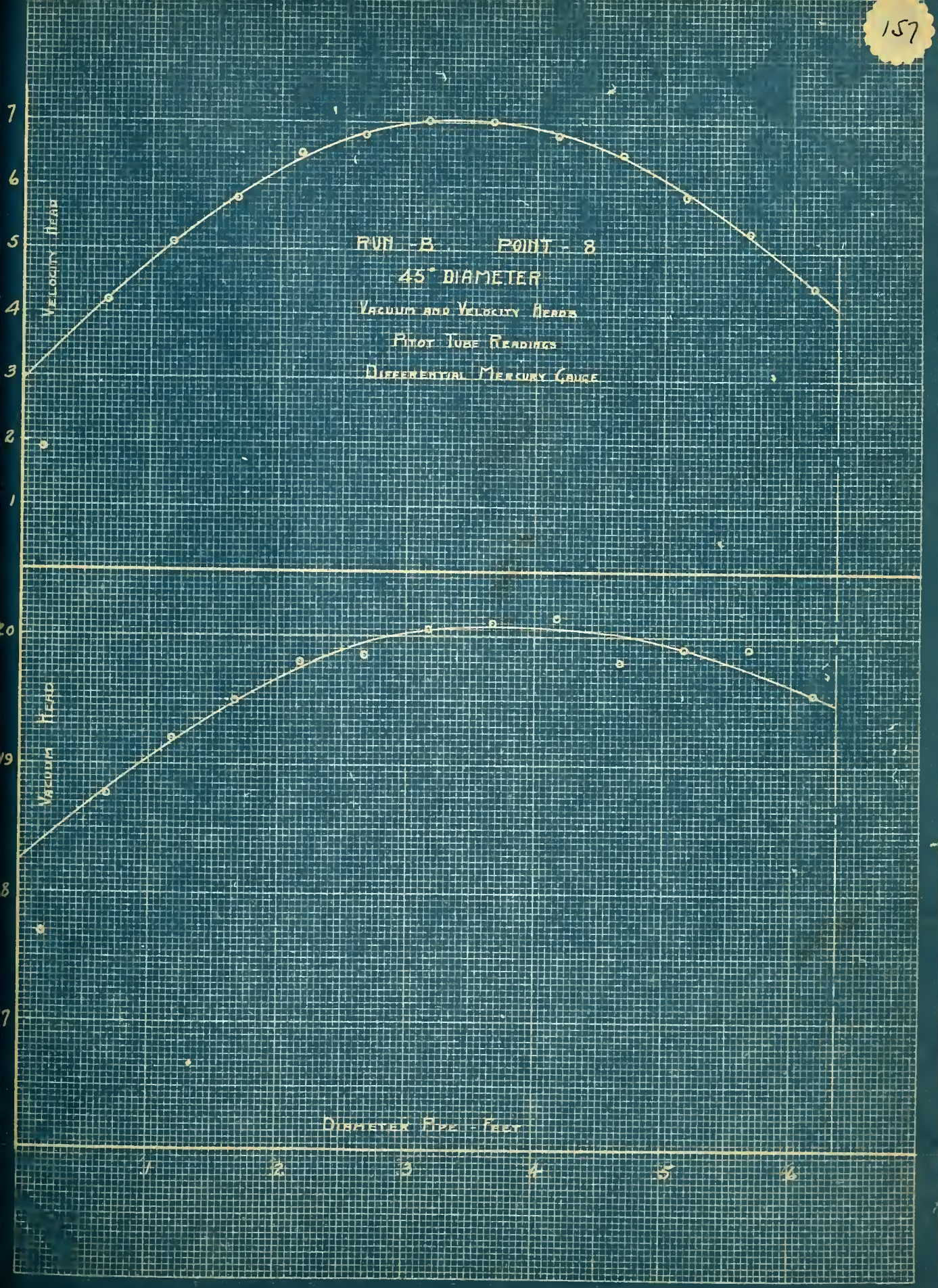

RUN - B
POINT - 7
45" DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
5
4
3
2
1
.6
.5
.4
.1
.2
.3
.4
.5
.6

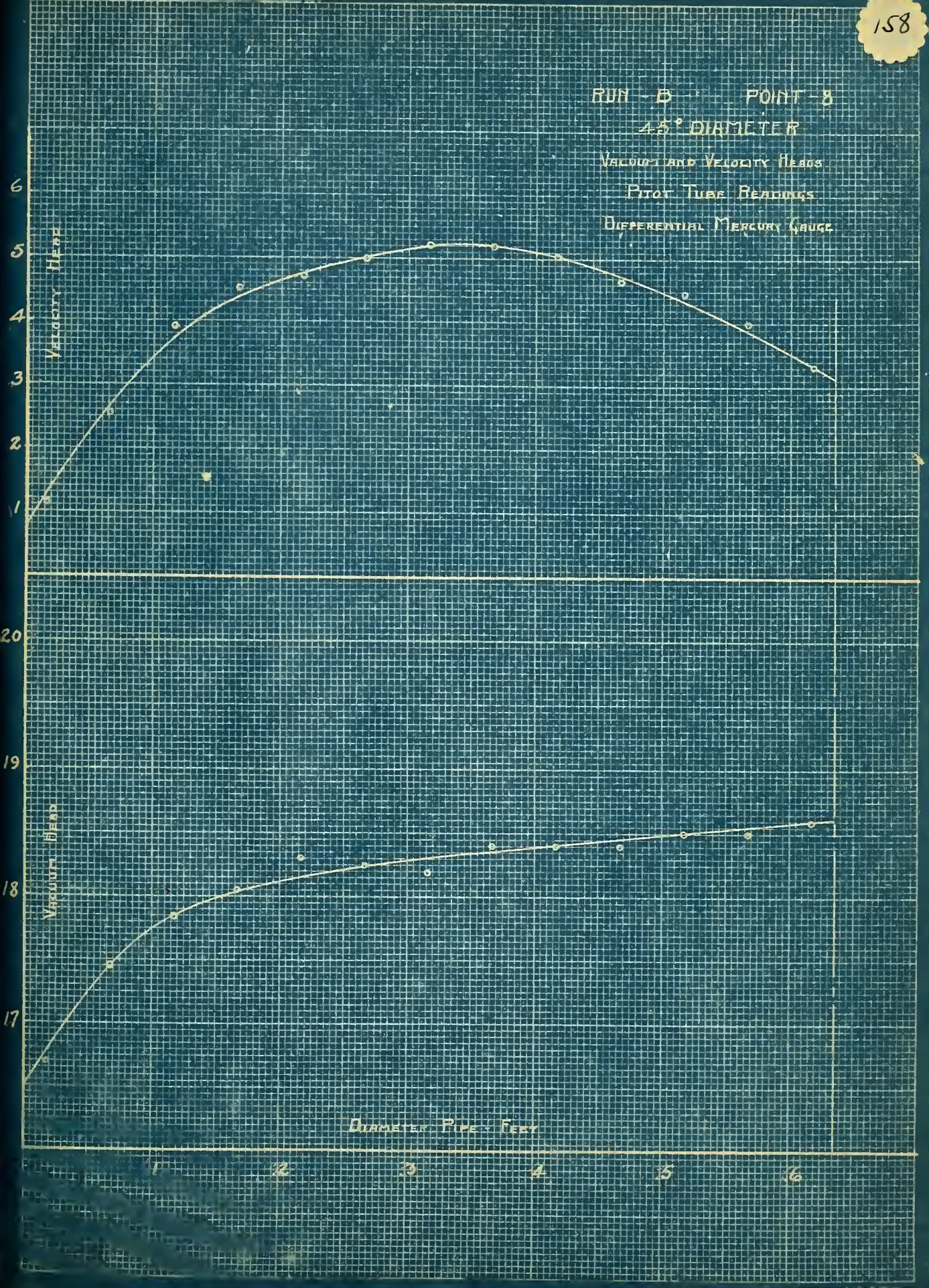

RUN - B POINT - 7
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER, PER. FEET
5
4
3
2
1
6
5
4
1
2
3
4
5
6

RUN - B POINT - 7
HORIZONTAL DIAMETER
VACUMO AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE




RUN - B POINT - 8
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
1
2
3
4
5
6


RUN - B POINT - 8
45" DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
VACUUM HEAD
DIAMETER PIPE - FEET
7
6
5
4
3
2
1
20
19
18
17
1
2
3
4
5
6


RUN - B POINT - 8
4.5" DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEAD
6
5
4
3
2
1
VACUUM HEAD
20
19
18
17
DIAMETER PIPE - FEET
1
2
3
4
5
6

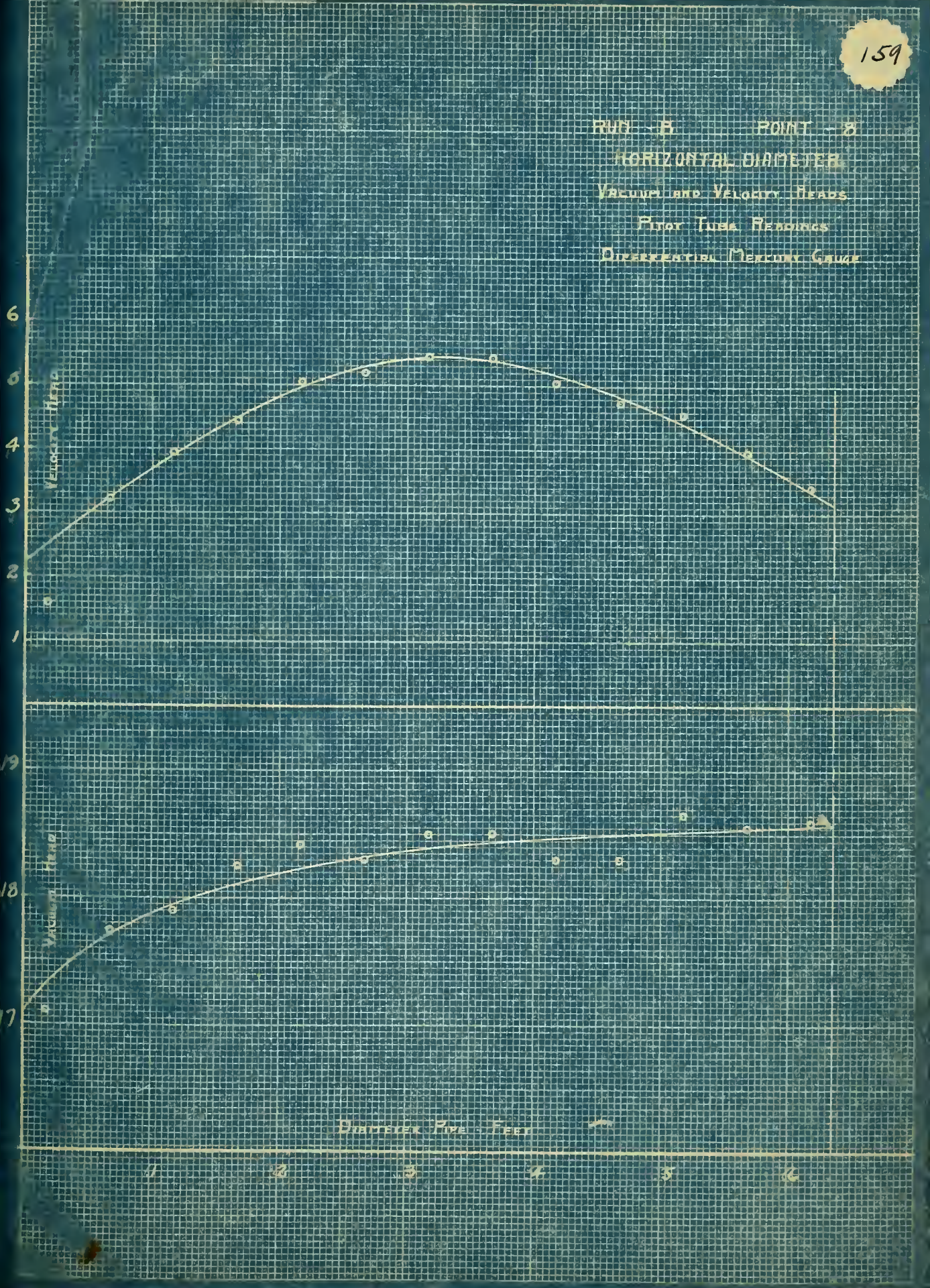
RUN - 18 POINT - 8

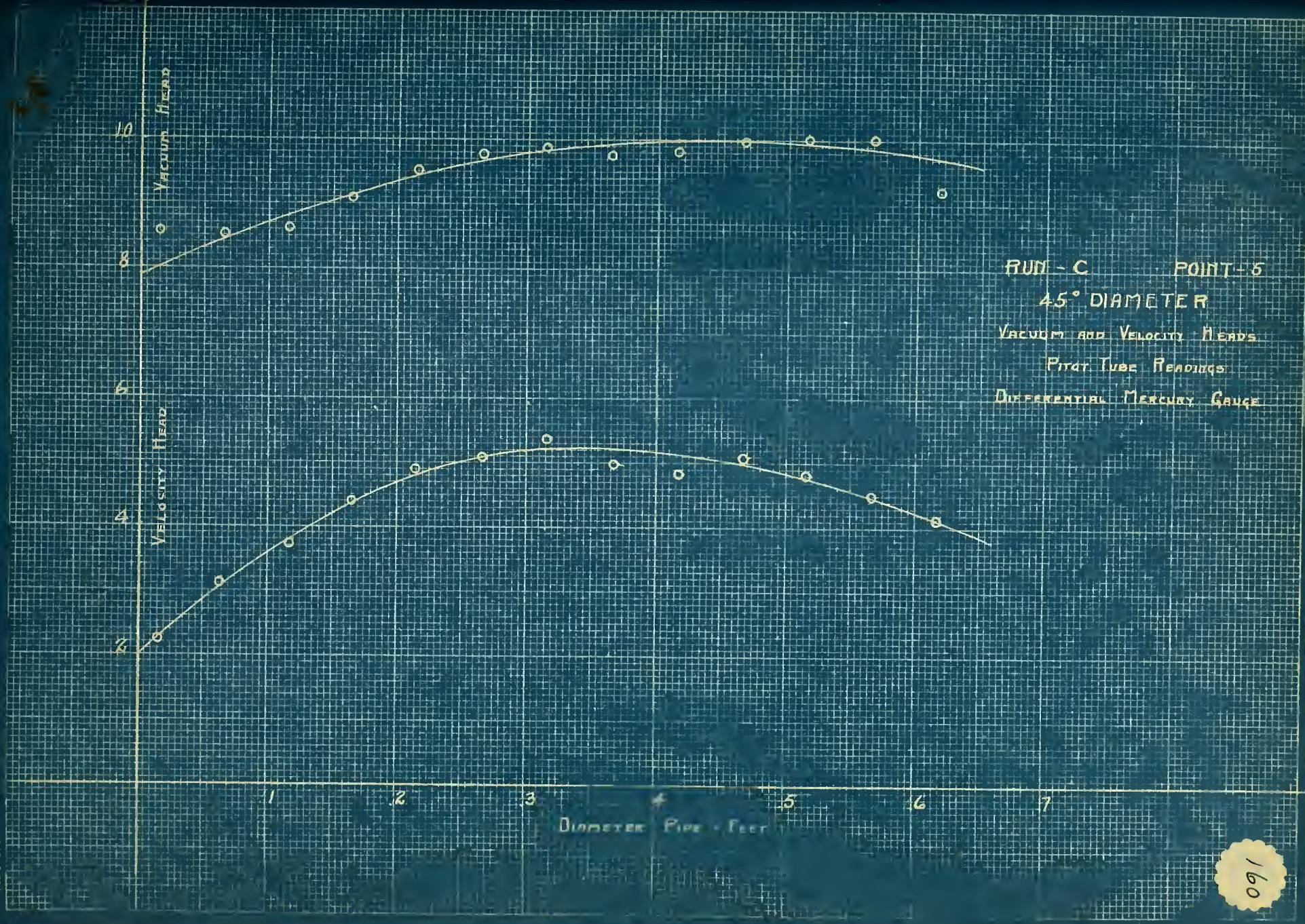
HORIZONTAL DIAMETER

VACUUM AND VELOCITY HEADS

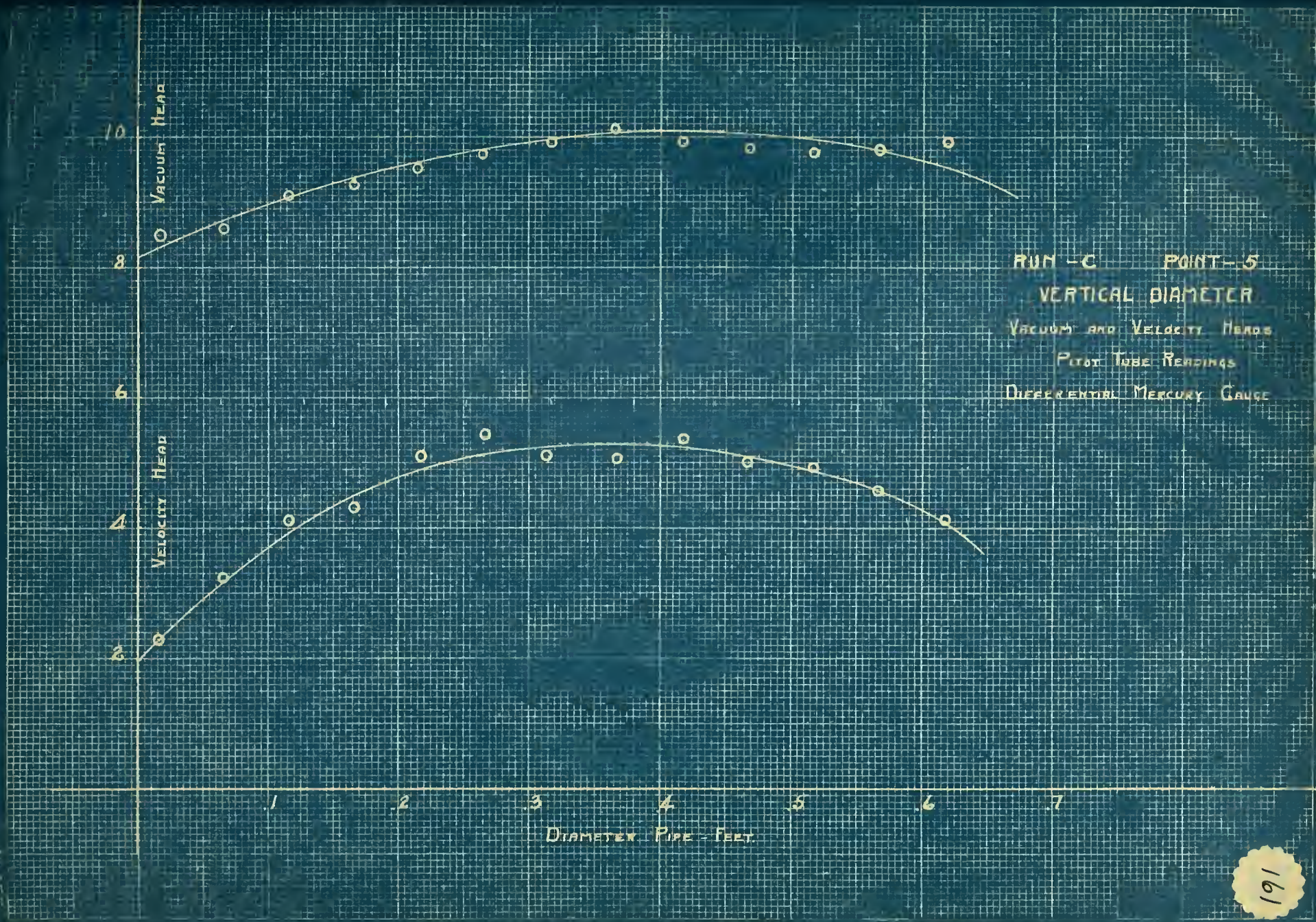
PITOT TUBE READINGS

DIFFERENTIAL MERCURY GAUGE

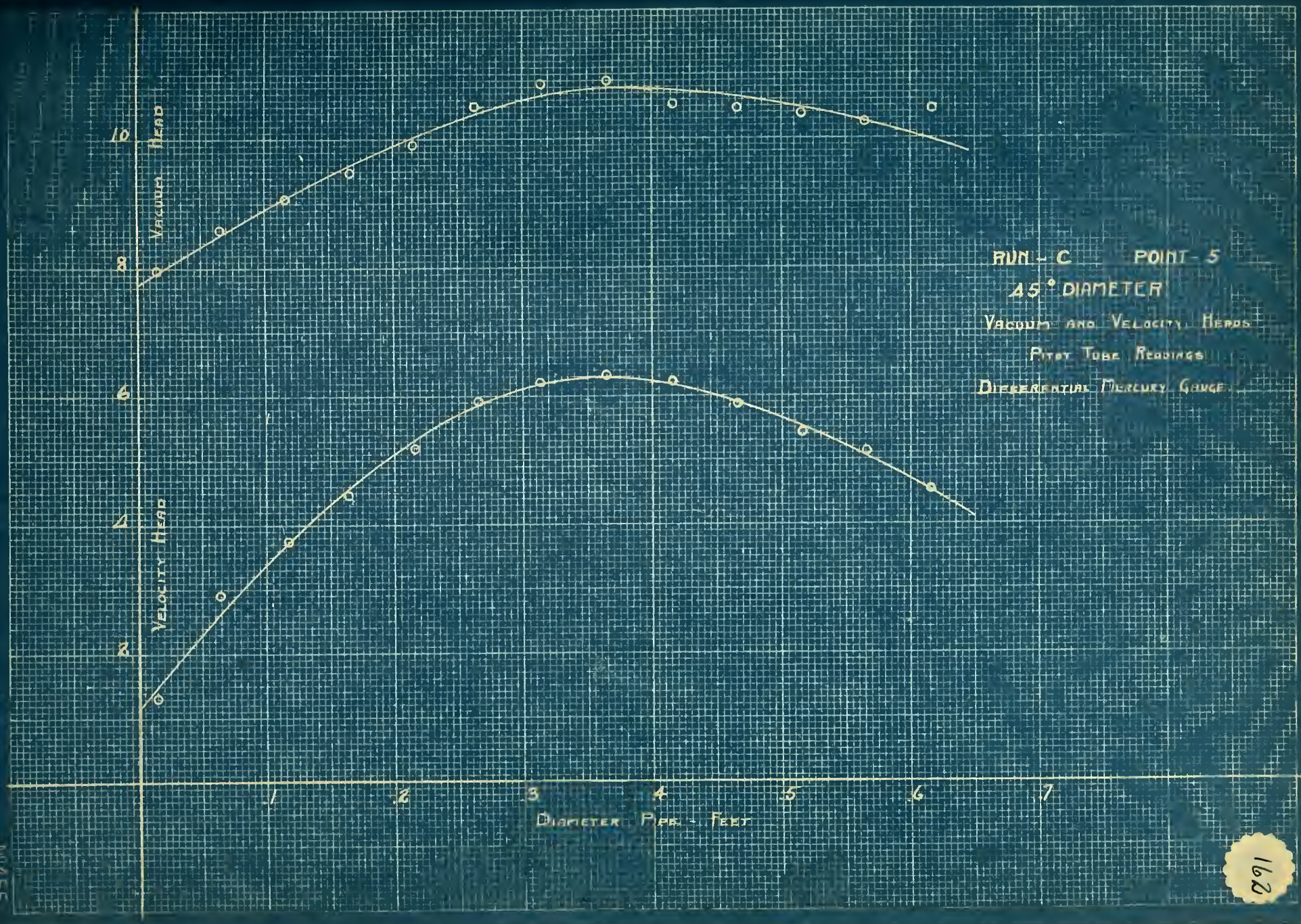


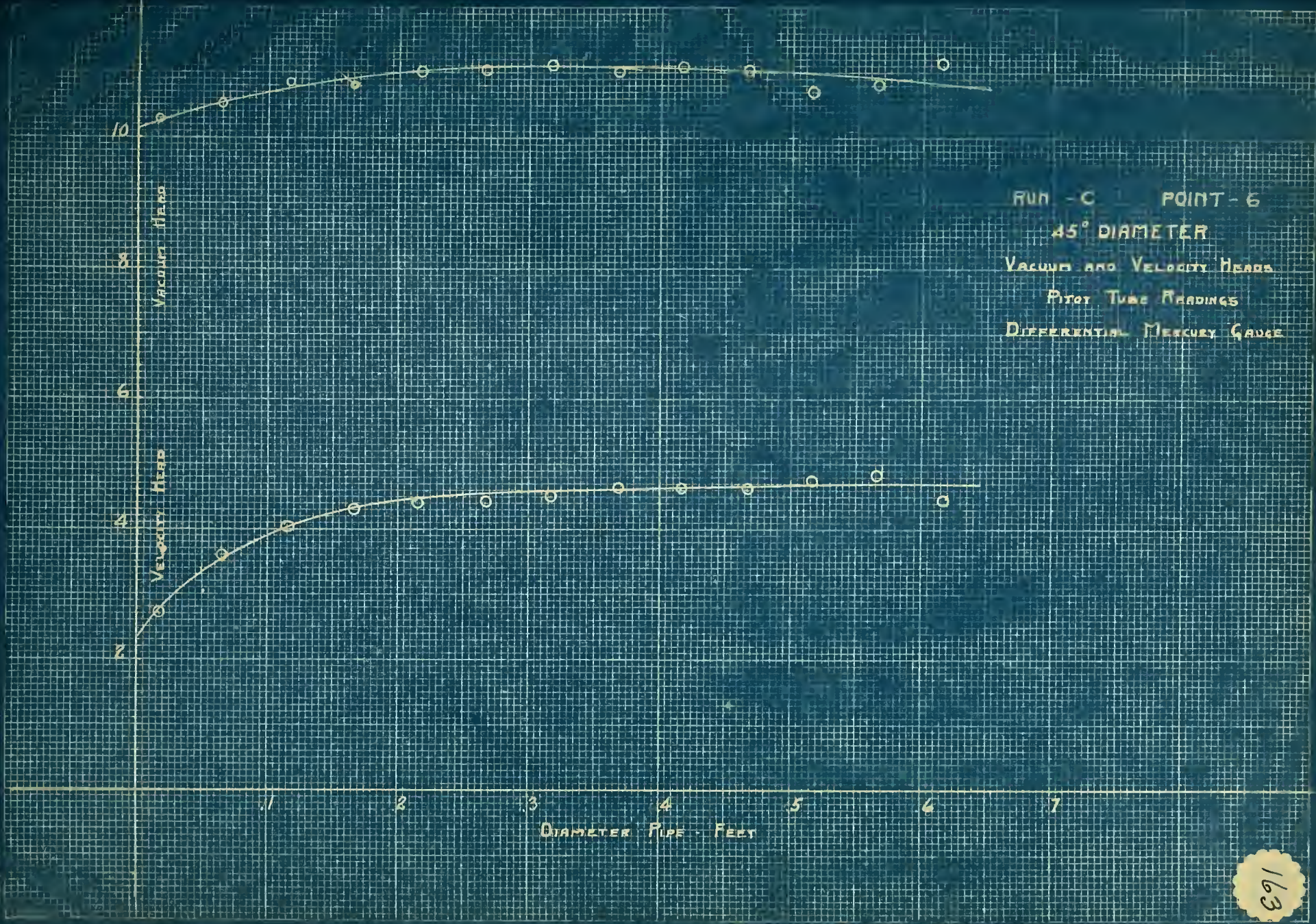

RUN - C POINT - 5
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
10
8
6
4
2
1
2
3
4
5
6
7
DIAMETER PIPE - FEET

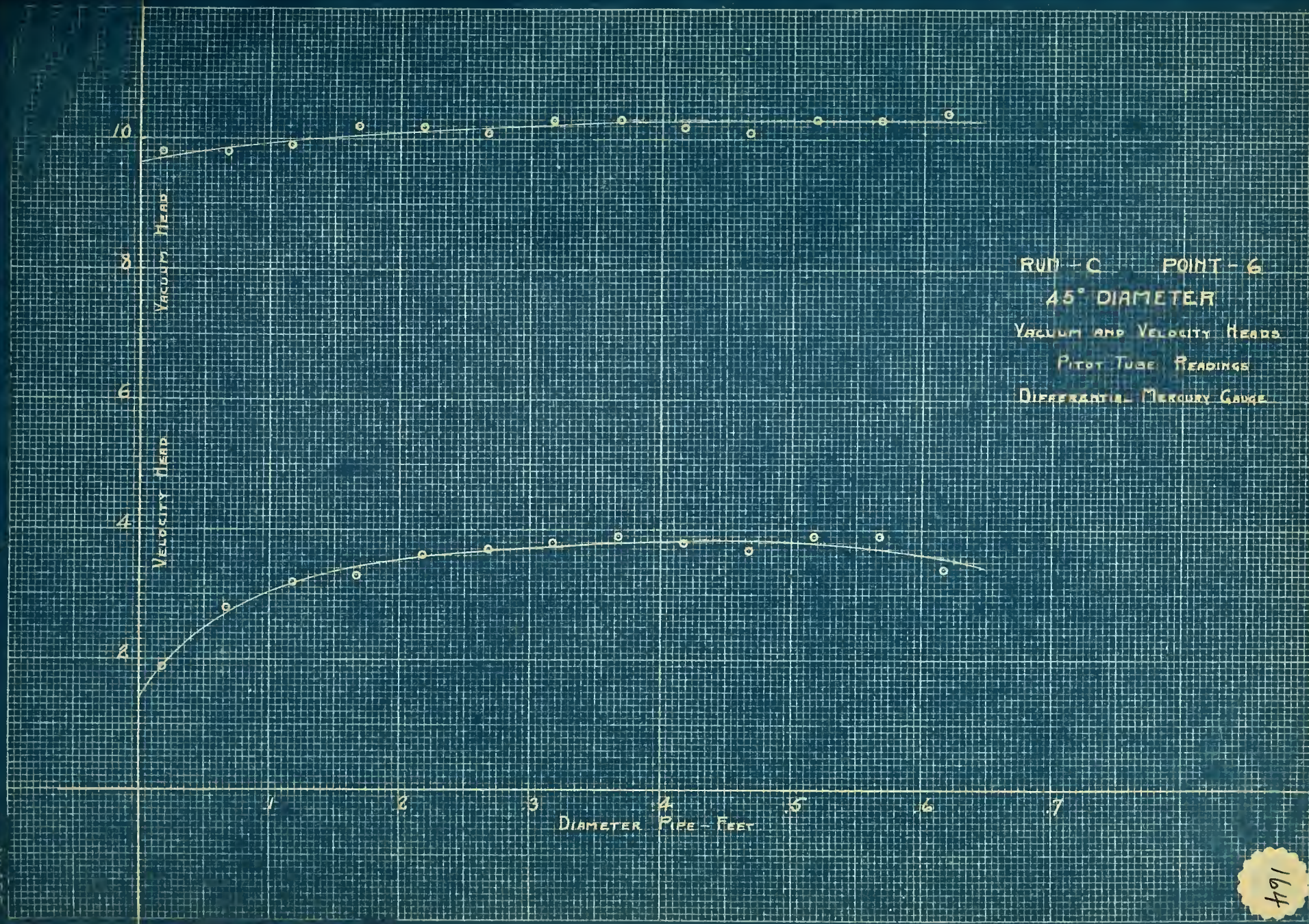
No455


RUN - C POINT - 5
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
10
8
6
4
2
.1
.2
.3
.4
.5
.6
.7
DIAMETER PIPE - FEET

191

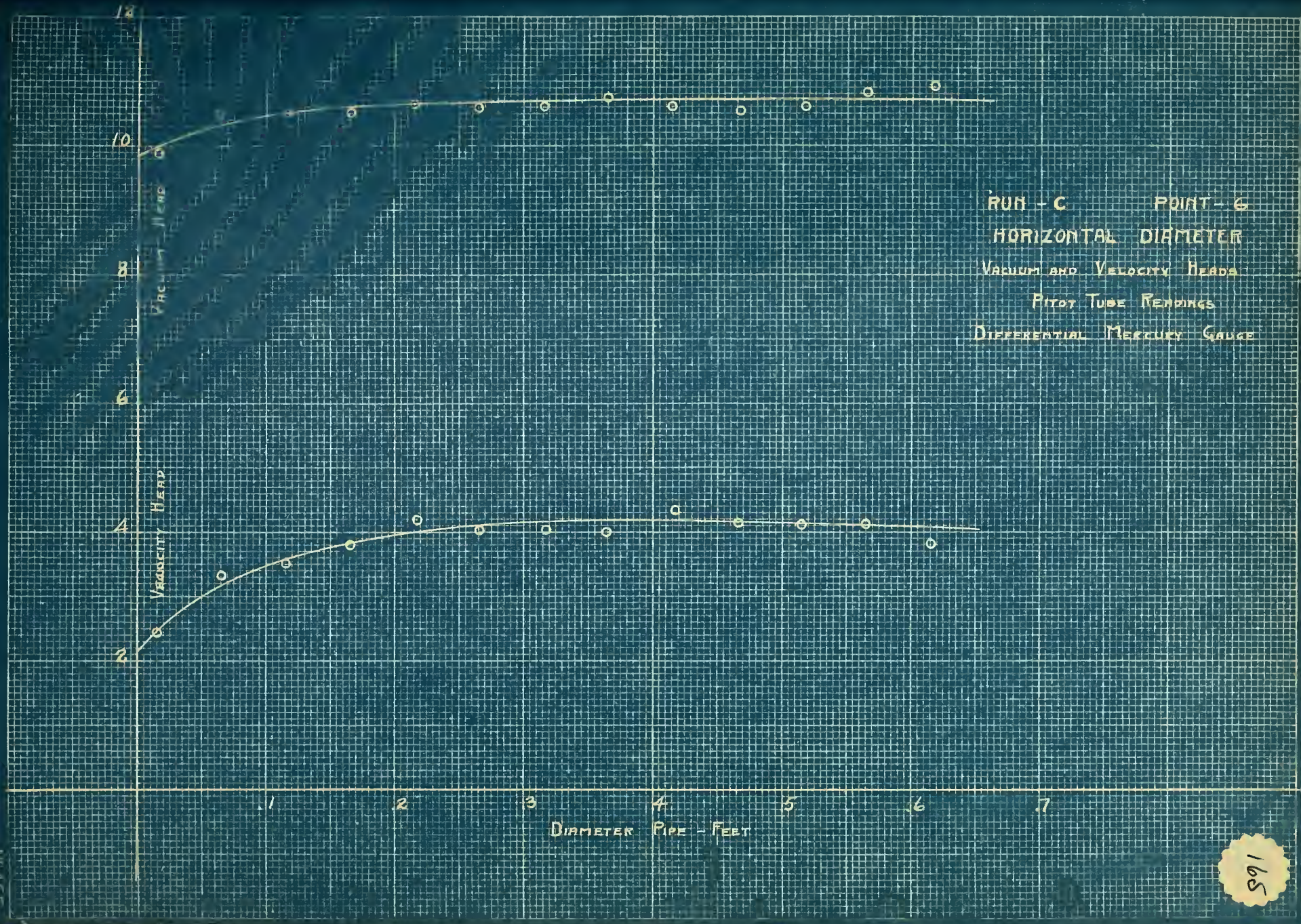

RUN - C POINT - 5
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
10
8
6
4
2
1
2
3
4
5
6
7
DIAMETER PIPE - FEET


RUN - C POINT - 6
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
10
8
6
4
2
.1
.2
.3
.4
.5
.6
.7
DIAMETER PIPE - FEET

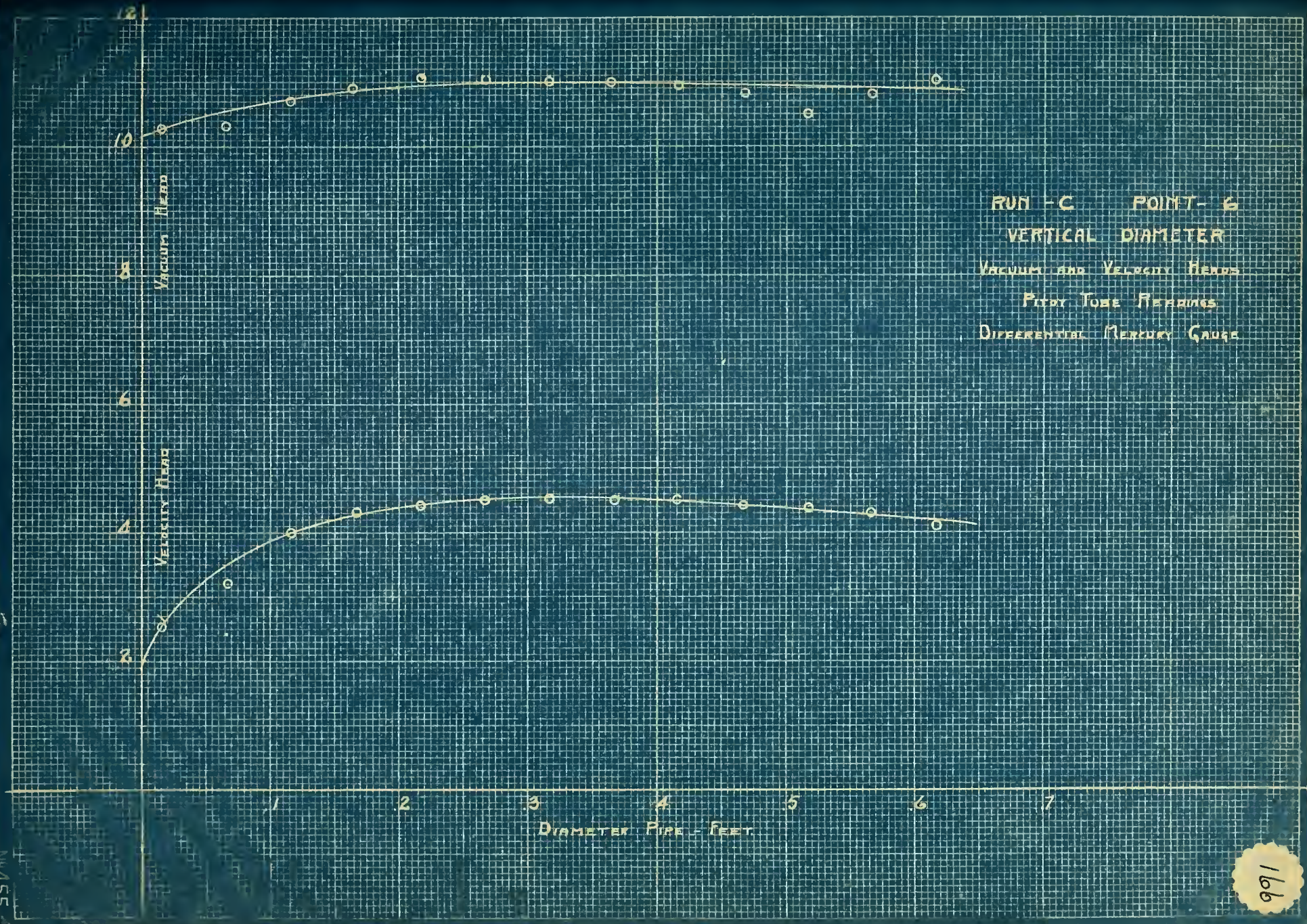

RUN - C POINT - 6
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
10
8
6
4
2
1
2
3
4
5
6
7
DIAMETER PIPE - FEET

1644

N°455

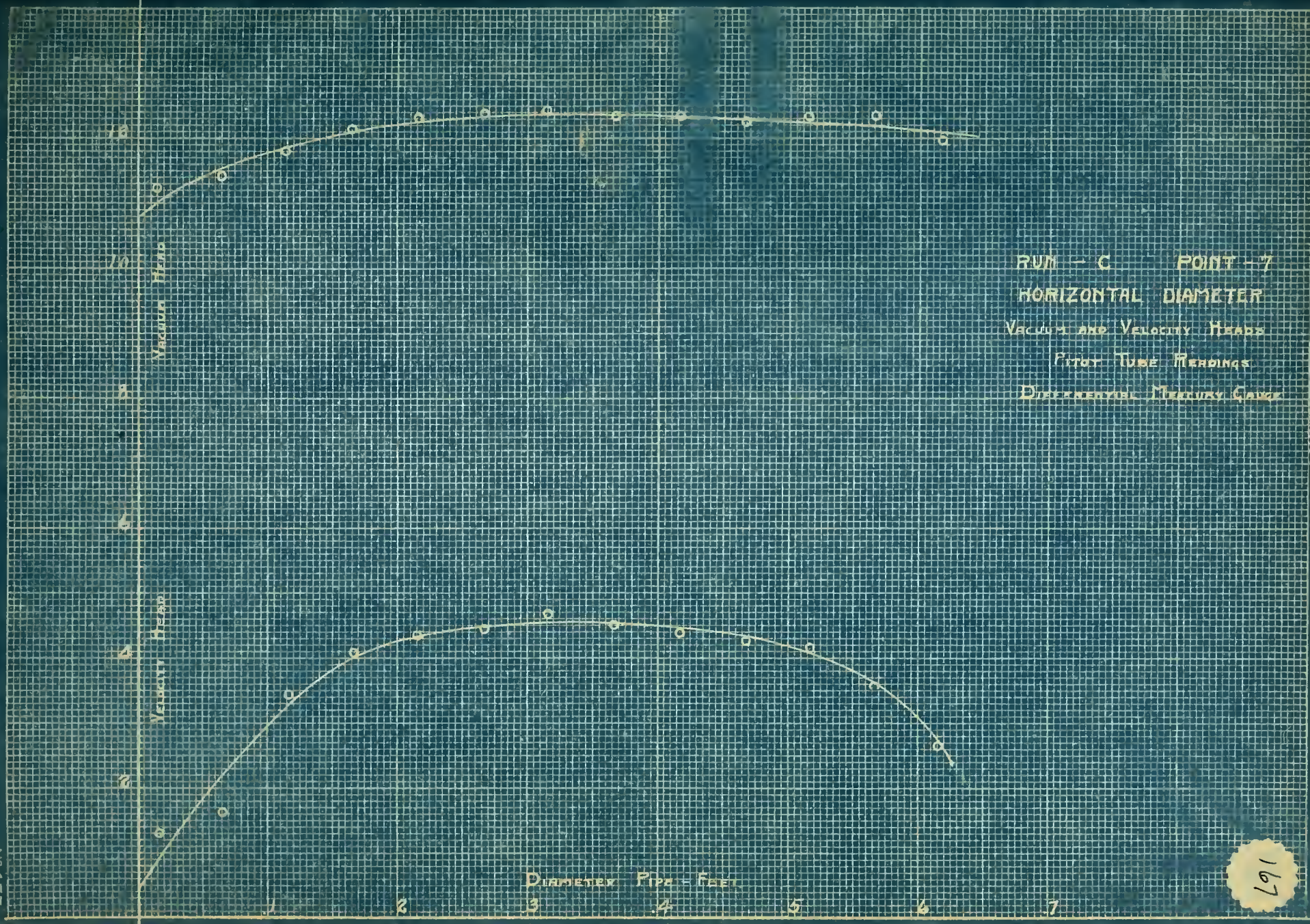

RUN - C POINT - 6
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
12
10
8
6
4
2
.1
.2
.3
.4
.5
.6
.7
DIAMETER PIPE - FEET

N455


RUN - C POINT - 6
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
12
10
8
6
4
2
1
2
3
4
5
6
7
DIAMETER PIPE - FEET

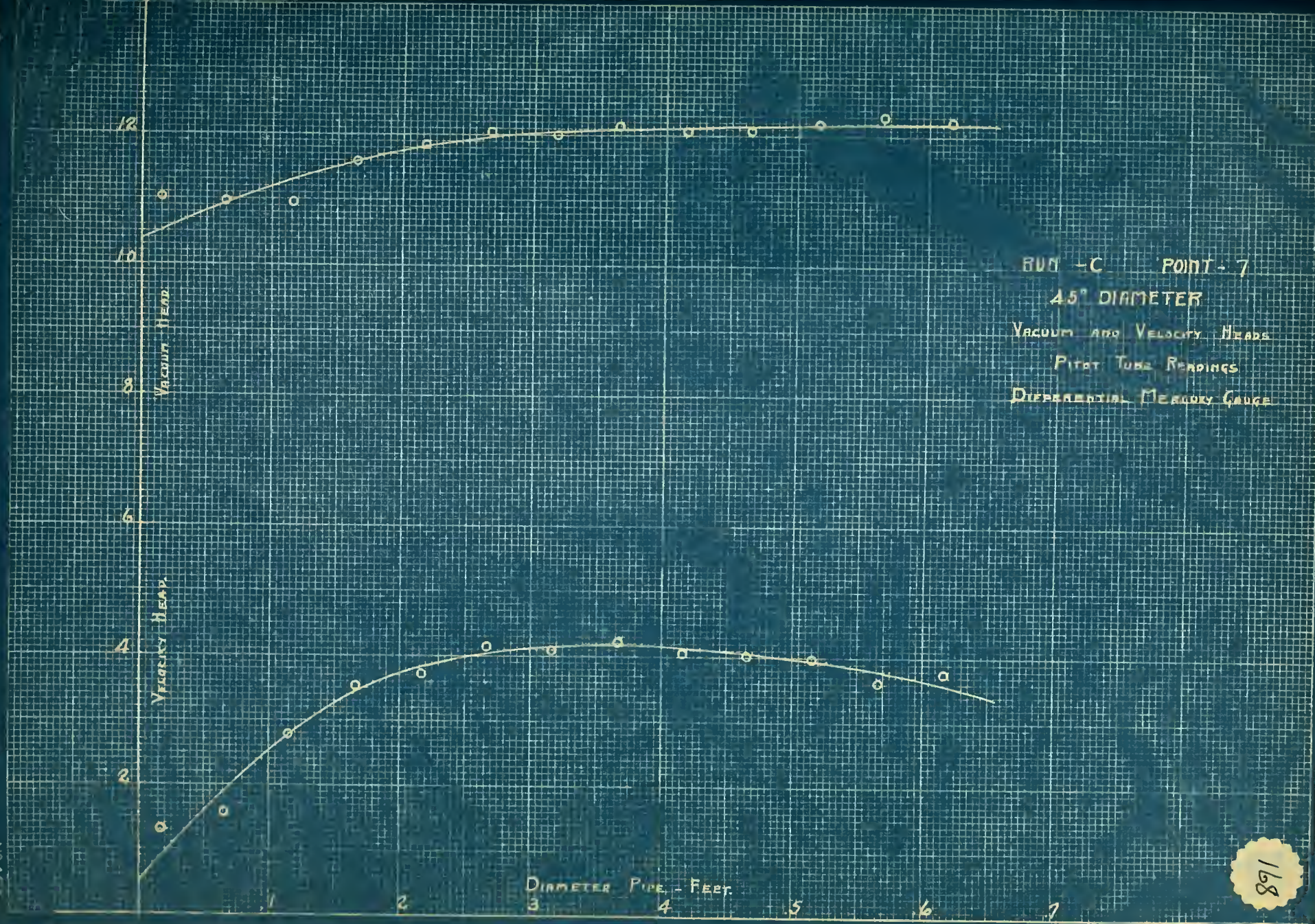
No 455

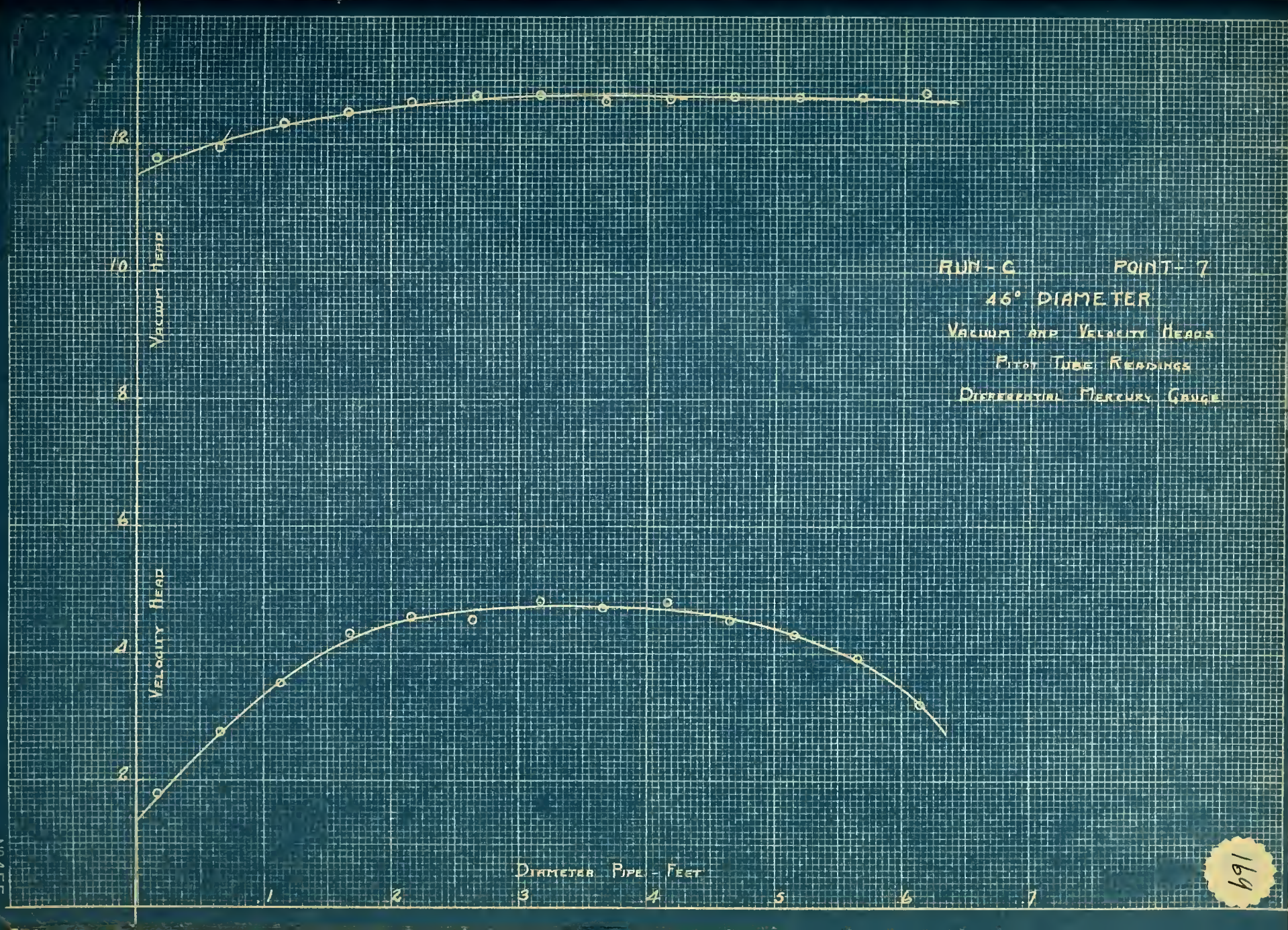
166


RUN - C POINT - 7
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
0
2
4
6
8
10
1
2
3
4
5
6
7

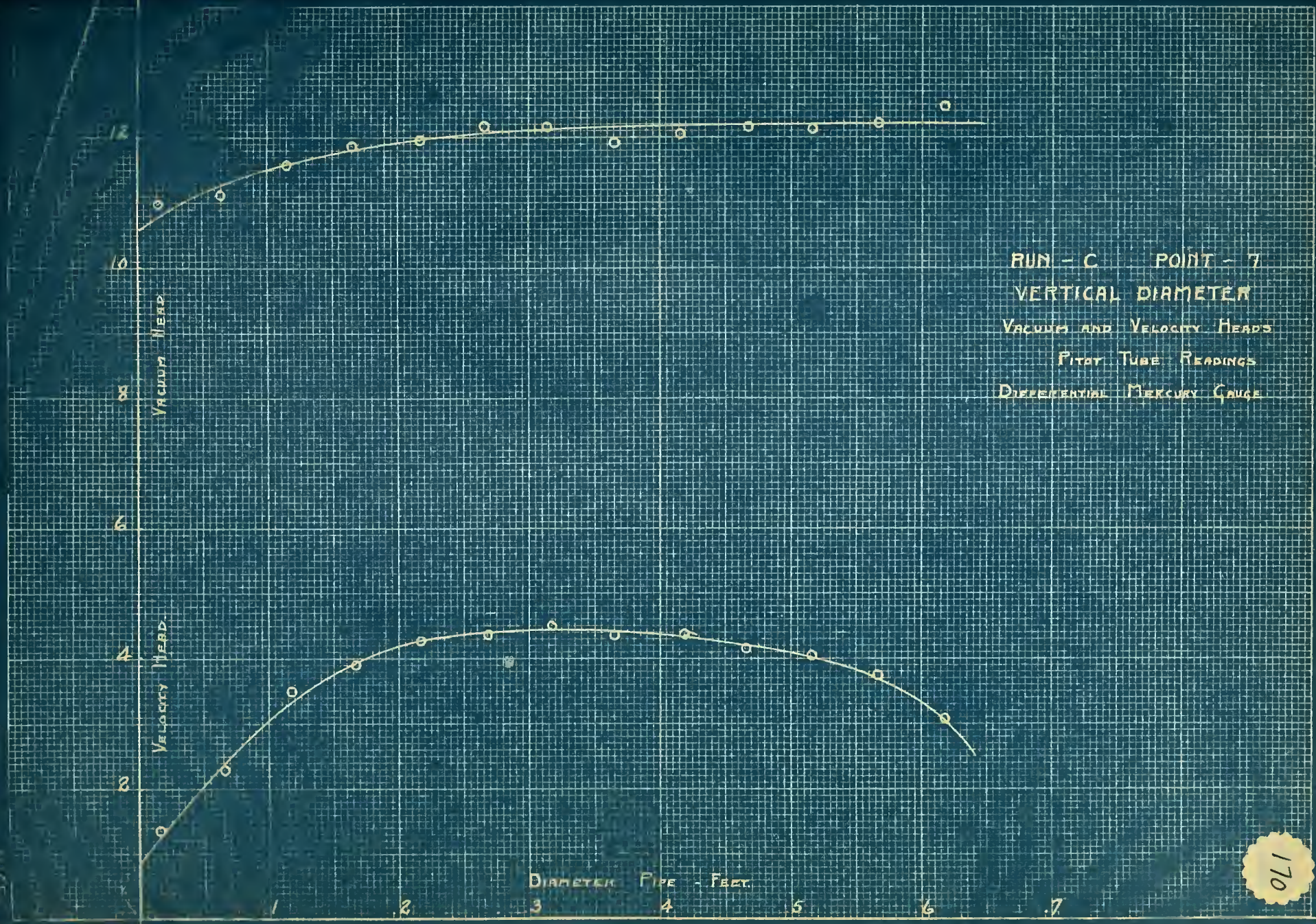
№455

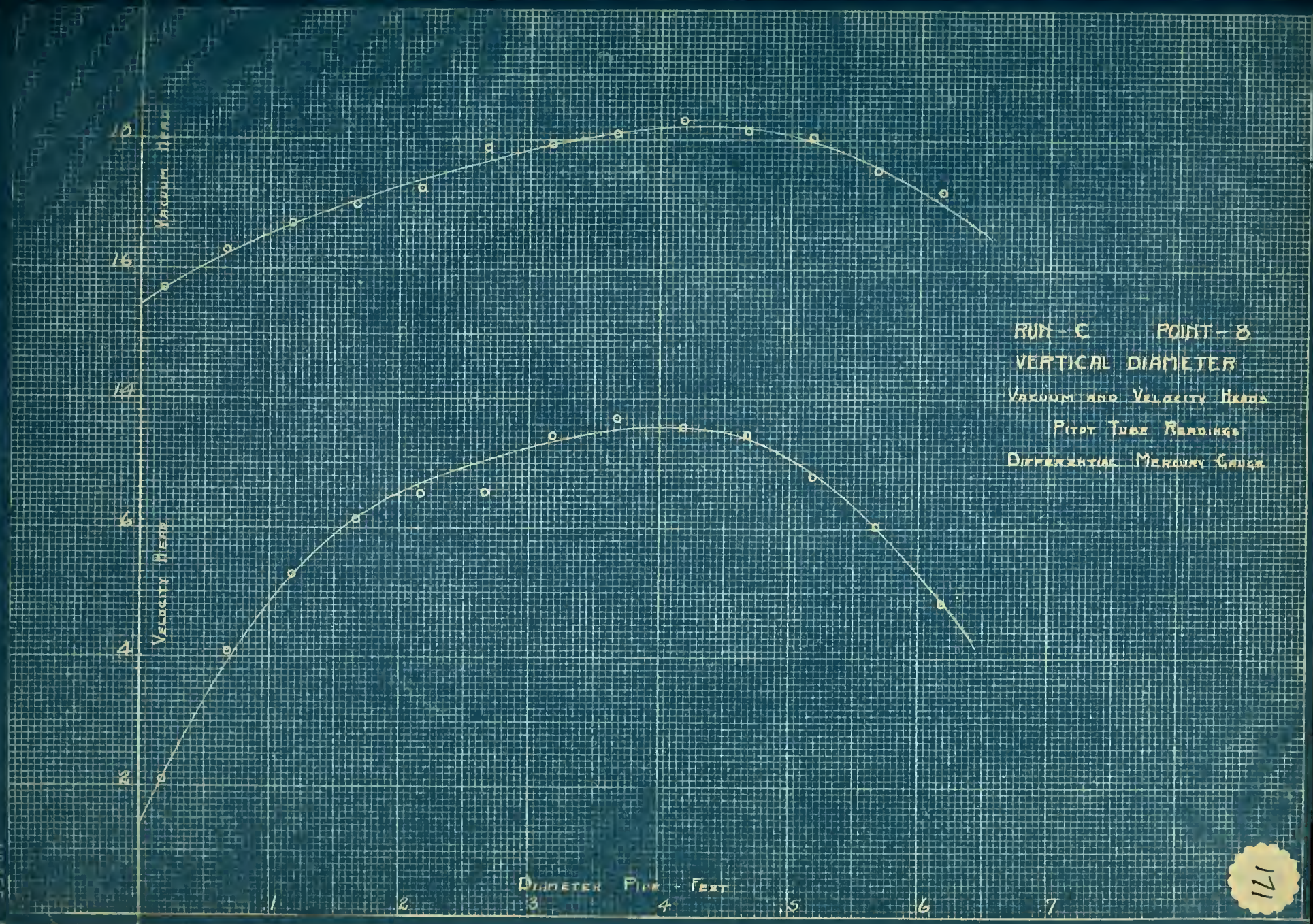
167

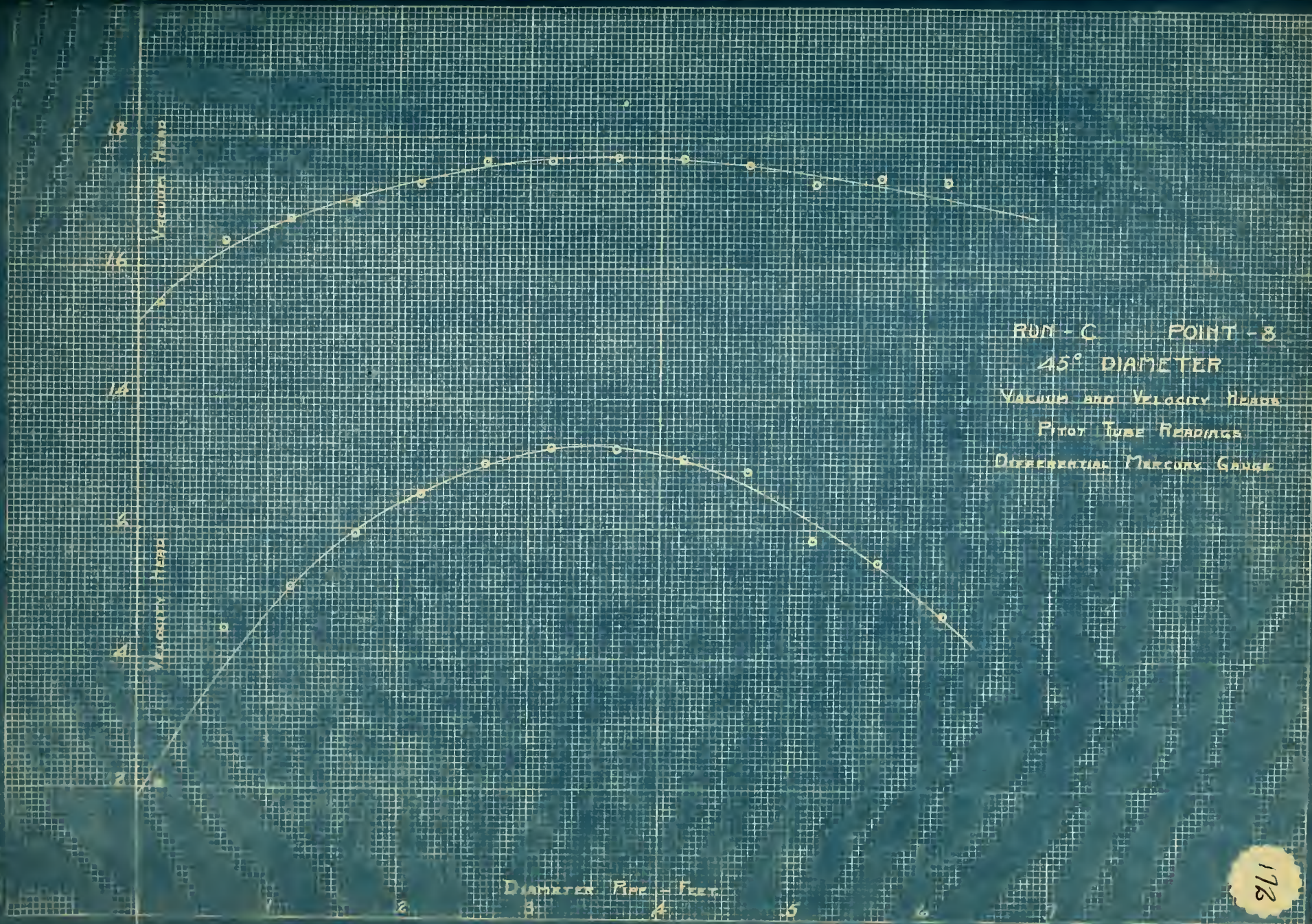

RUN - C POINT - 7
45" DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
12
10
8
6
4
2
1
2
3
4
5
6
7
168

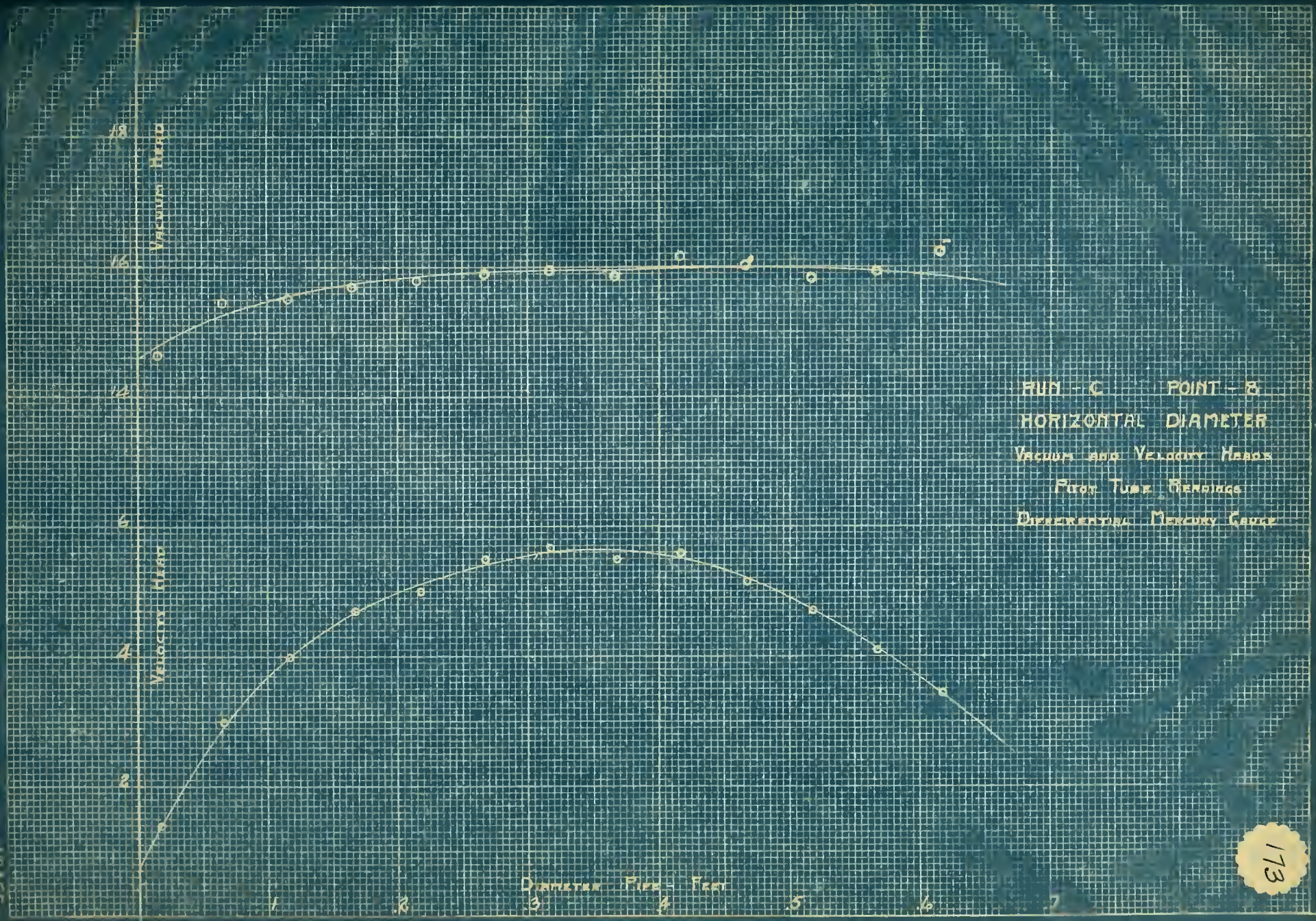

RUN - C
POINT - 7
46° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
12
10
8
6
4
2
1
2
3
4
5
6
7

№455


RUN - C POINT - 7
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
12
10
8
6
4
2
1
2
3
4
5
6
7

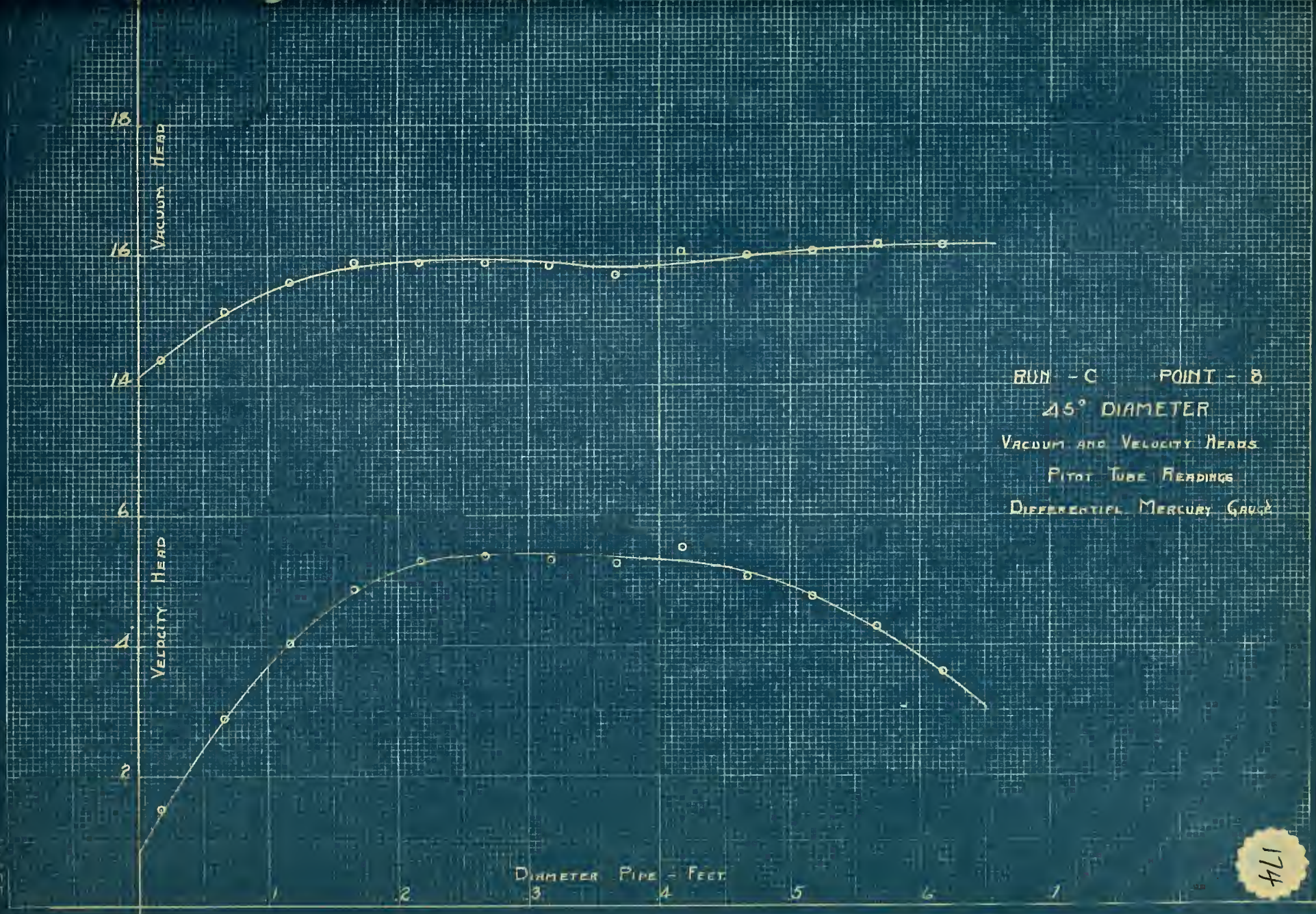

RUN - C POINT - 8
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
10
16
14
6
4
2
1
2
3
4
5
6
7

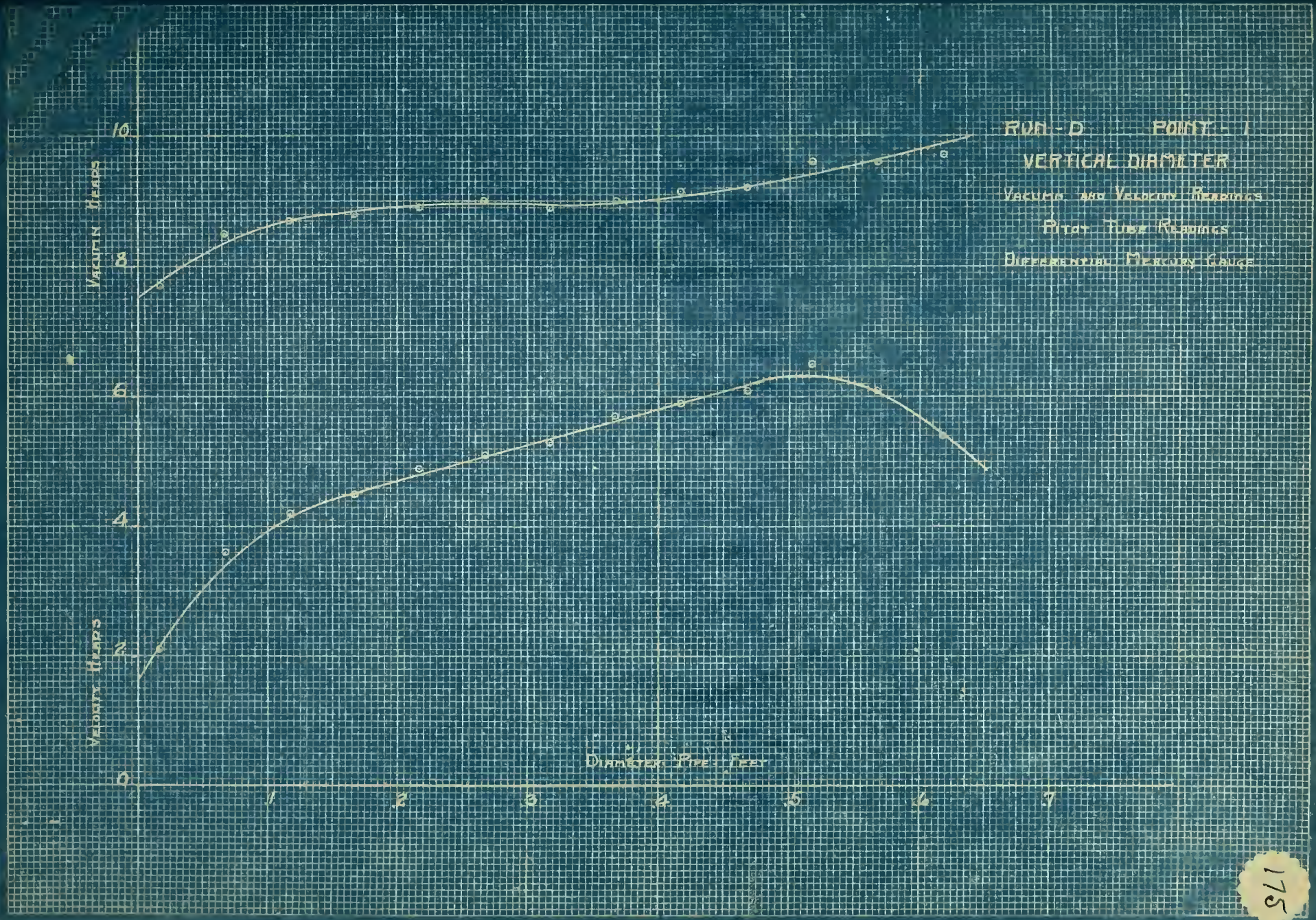

RUN - C POINT - 8
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
.8
.16
.12
.8
.4
.2
1
2
3
4
5
6
7

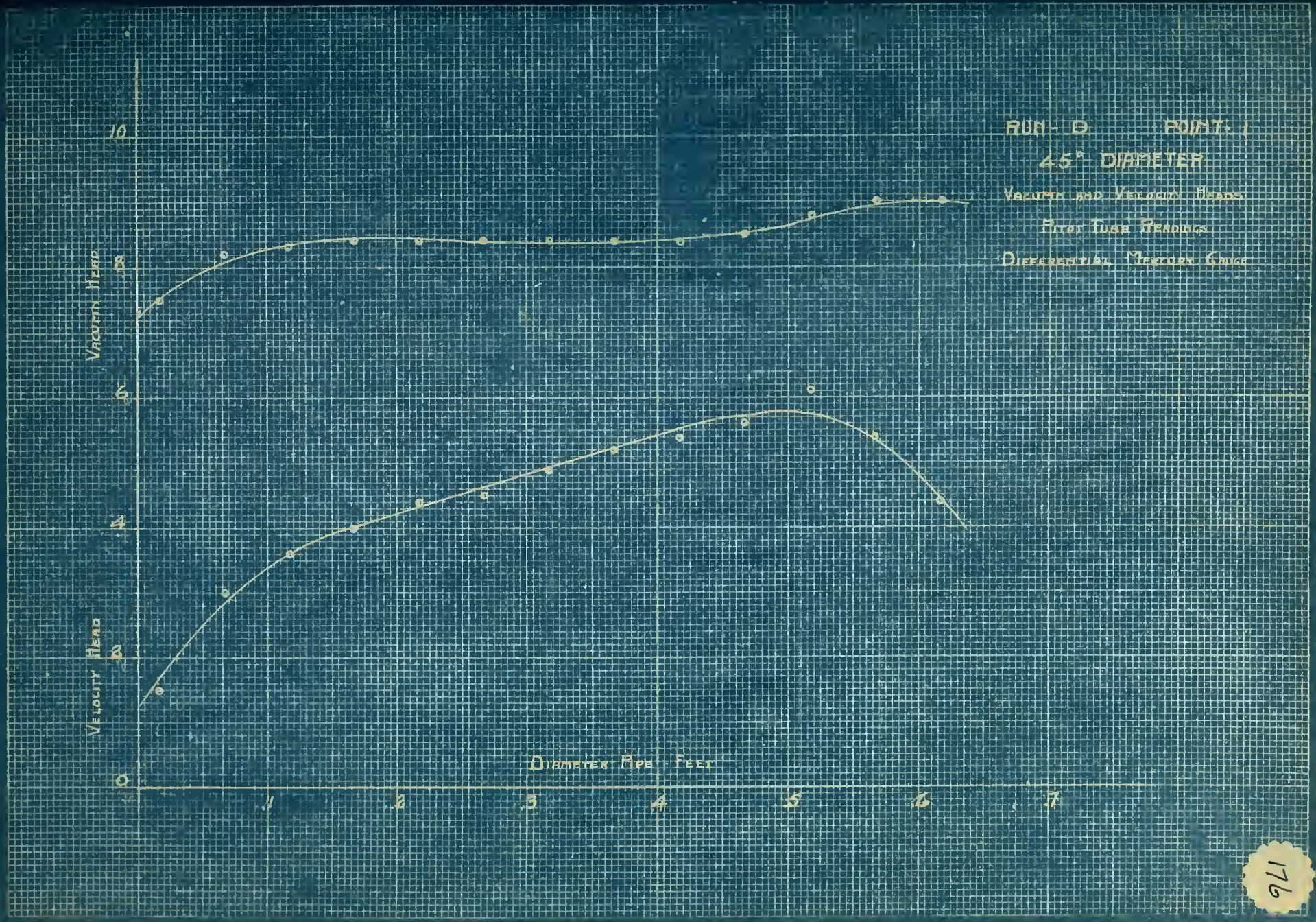

Run C Point 8
Horizontal Diameter
Vacuum and Velocity Heads
Pitot Tube Readings
Differential Mercury Gauge
Vacuum Head
Velocity Head
Diameter Pipe, Feet
18
16
14
6
4
2
1
2
3
4
5
6
7

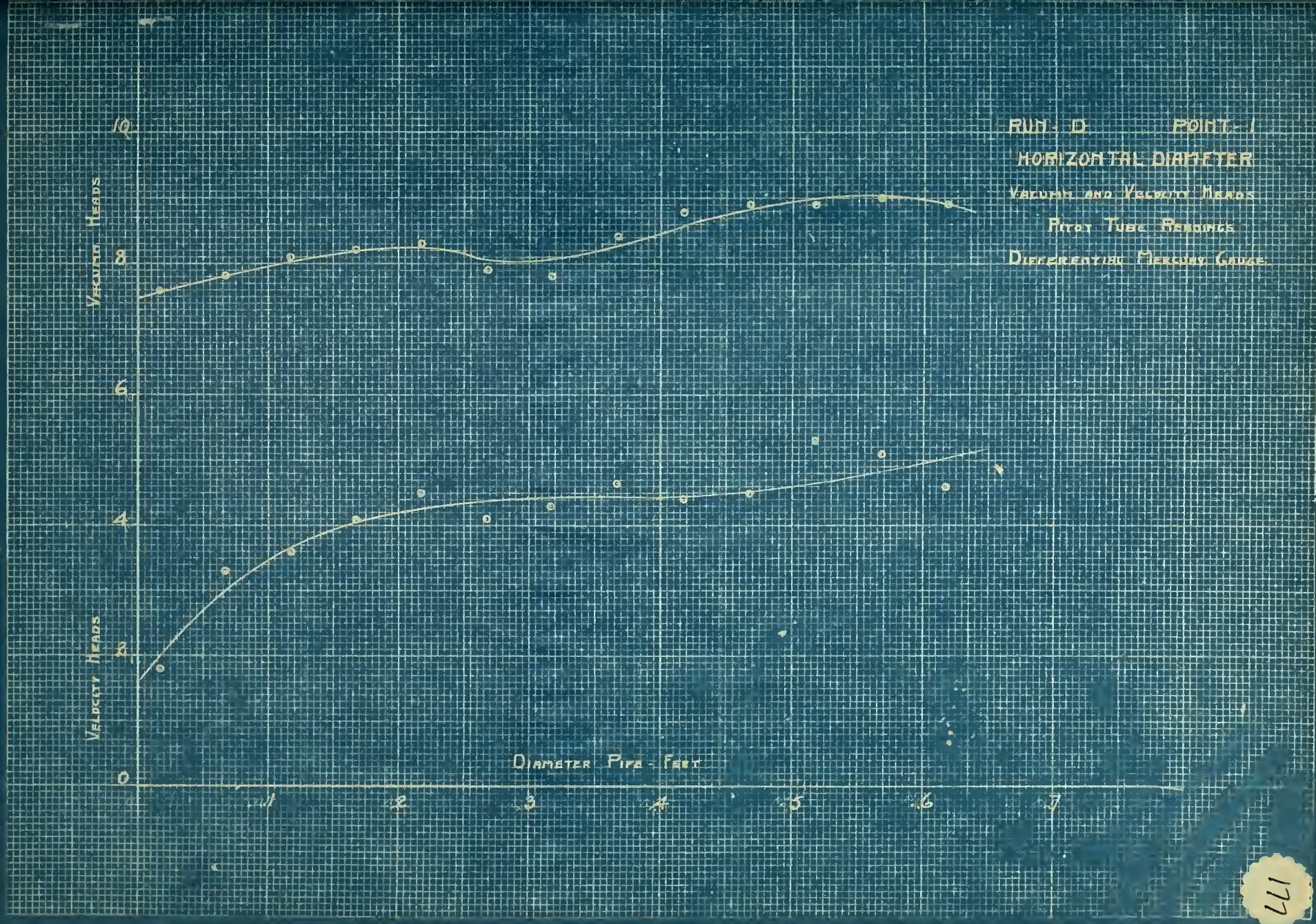
173

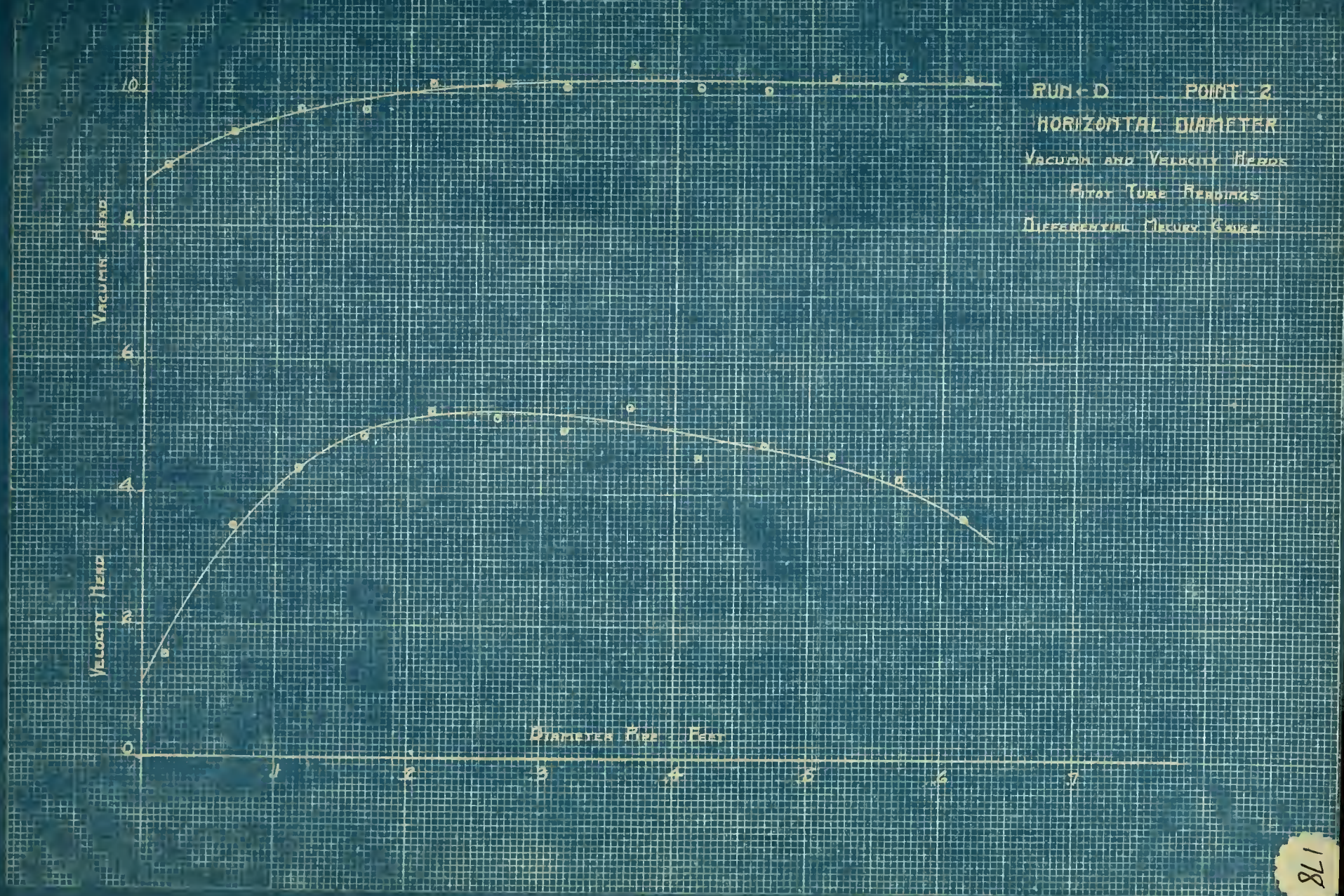
N9455

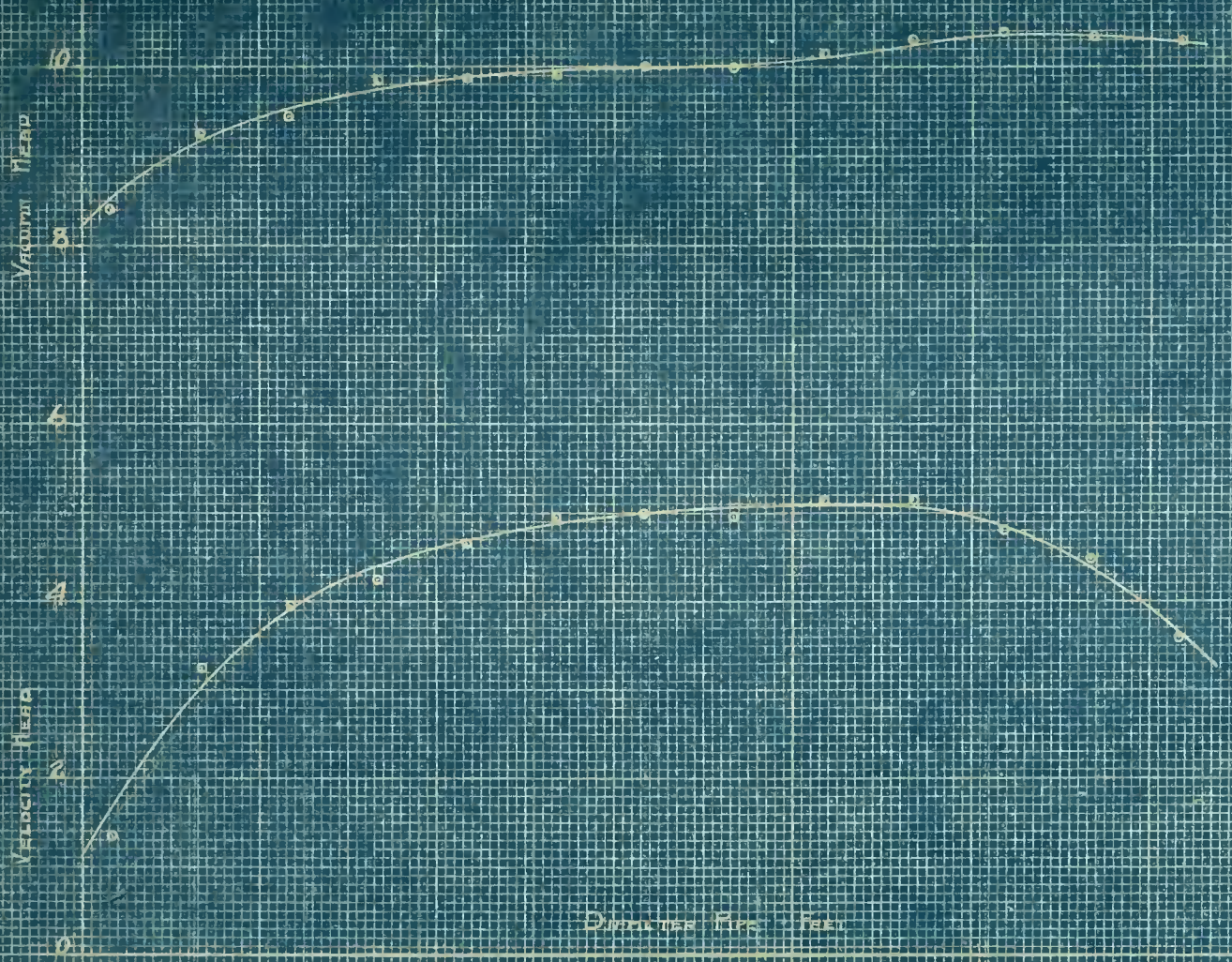

RUN - C POINT - 8
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
18
16
14
6
4
2
1
2
3
4
5
6
7

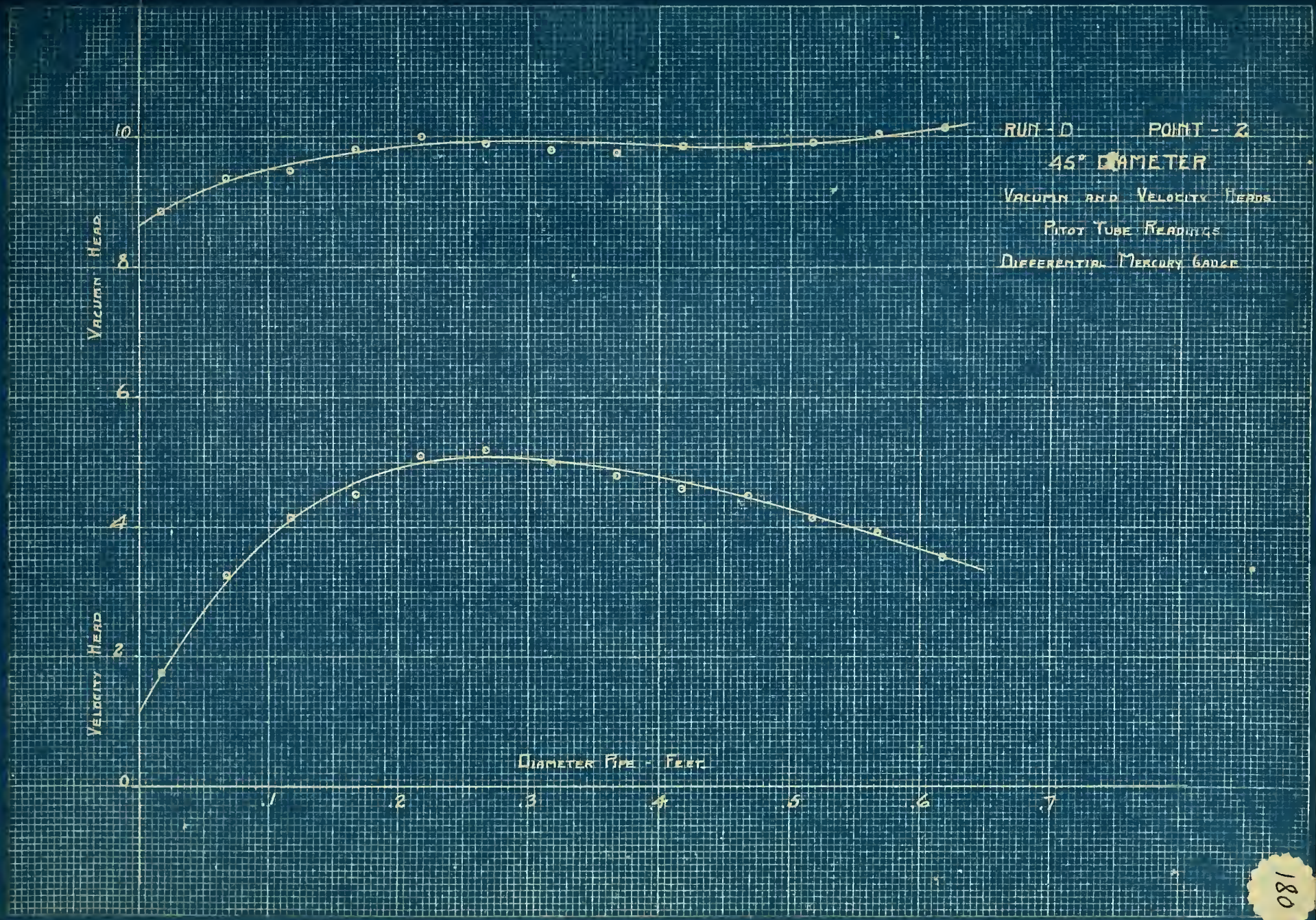

RUN - D POINT - 1
VERTICAL DIAMETER
VACUUM AND VELOCITY READINGS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEADS
VELOCITY HEADS
DIAMETER (PIPE) FEET
0
2
4
6
8
10
1
2
3
4
5
6
7

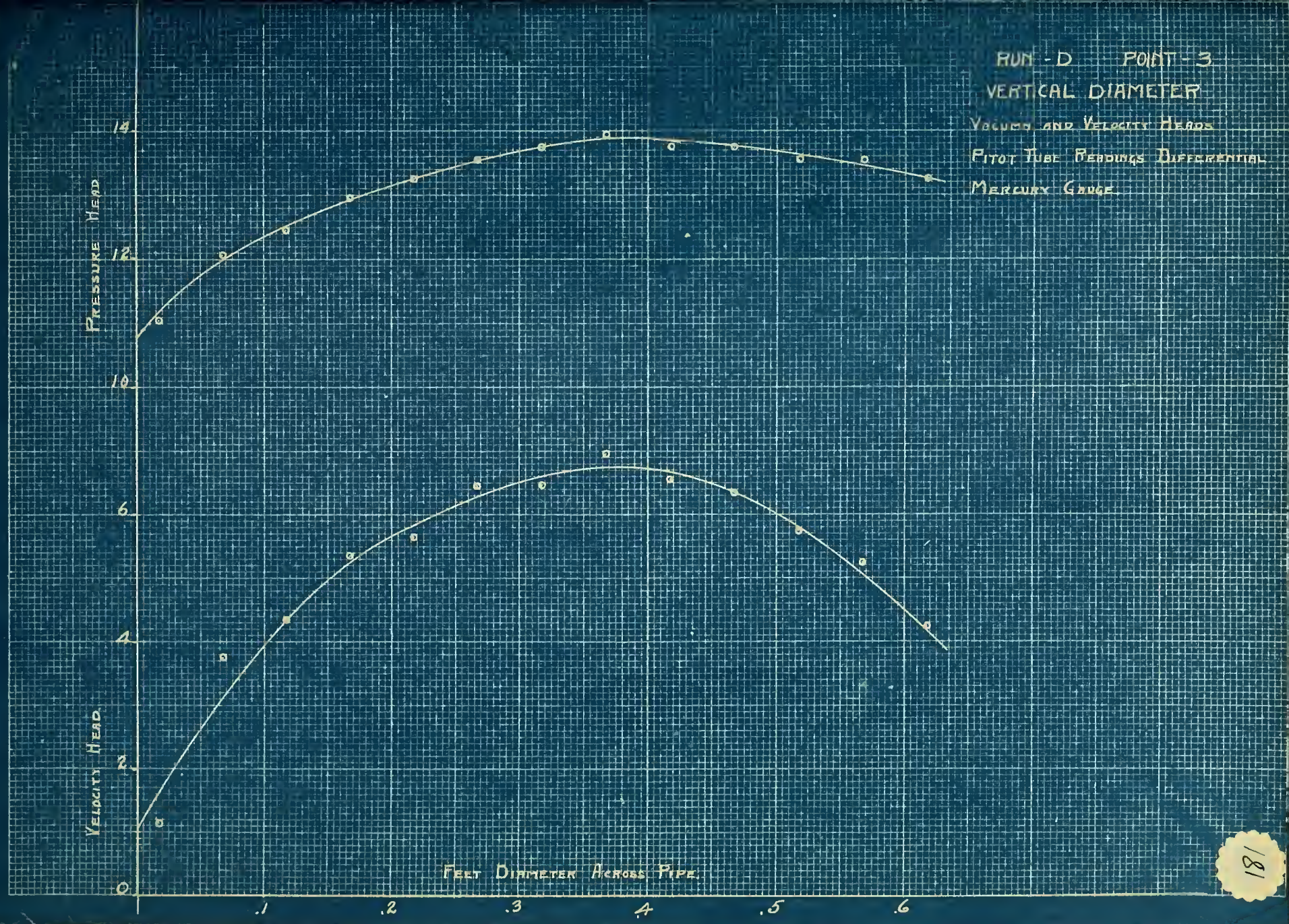

RUN: D POINT: 1
45" DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
10
8
6
4
2
0
1
2
3
4
5
6
7

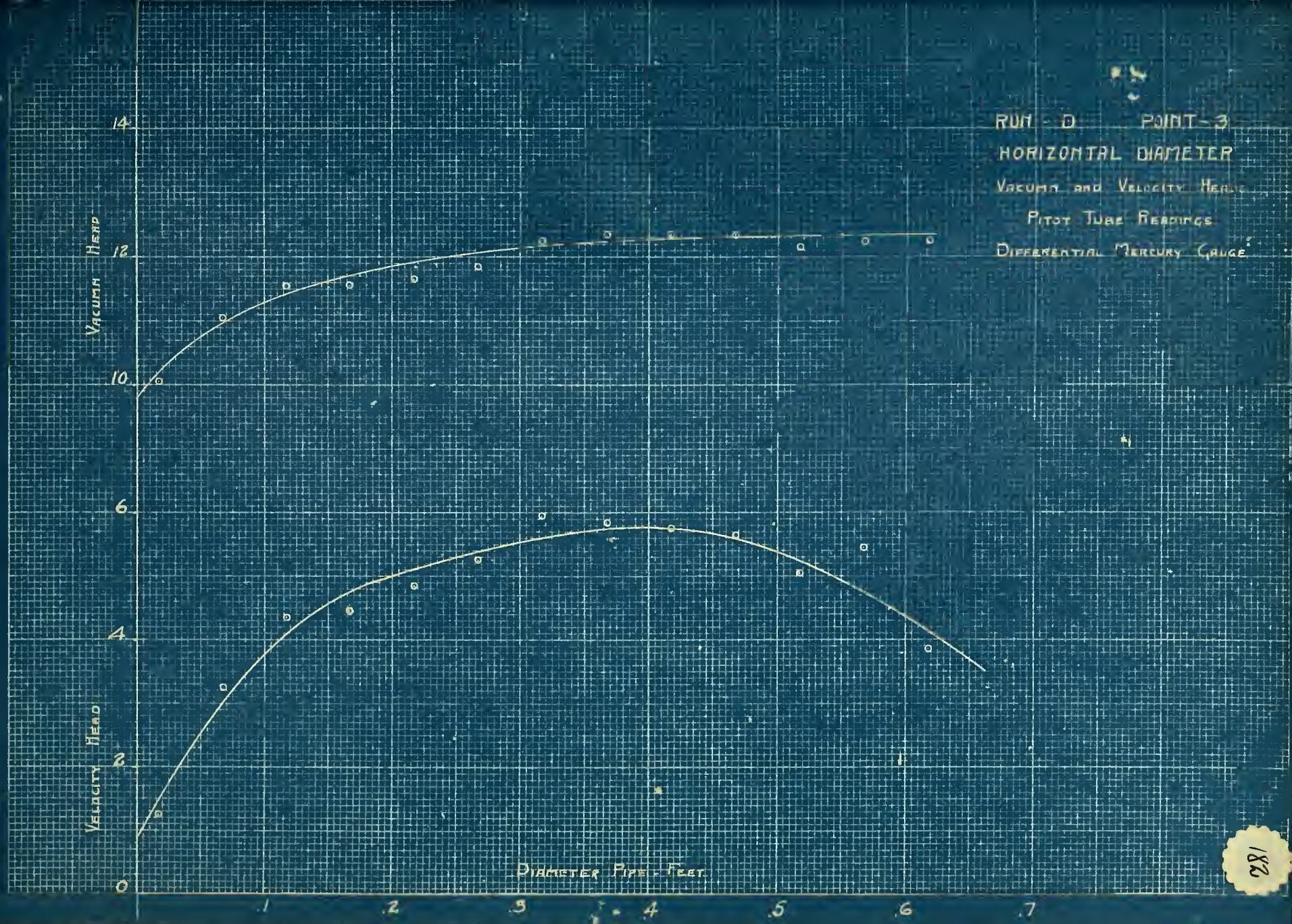

RUN: D POINT: 1
HORIZONTAL DIAMETER
VELOCITY AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VELOCITY HEADS
VELOCITY HEADS
DIAMETER PIPE - FEET
0
.2
.4
.6
.8
1.0
.1
.2
.3
.4
.5
.6
.7

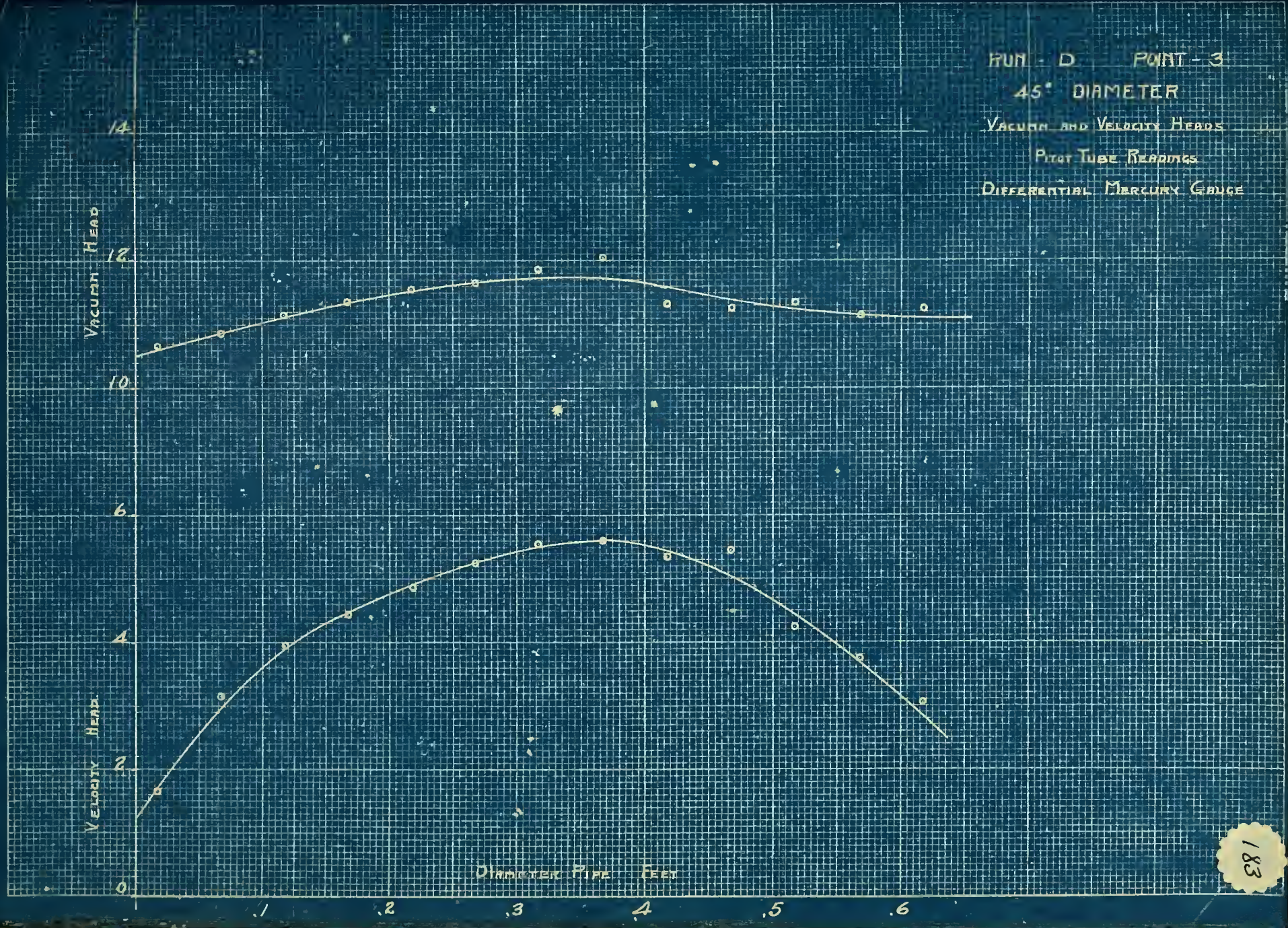

RUN - D POINT - 2
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
0
.2
.4
.6
.8
1.0
.1
.2
.3
.4
.5
.6
.7

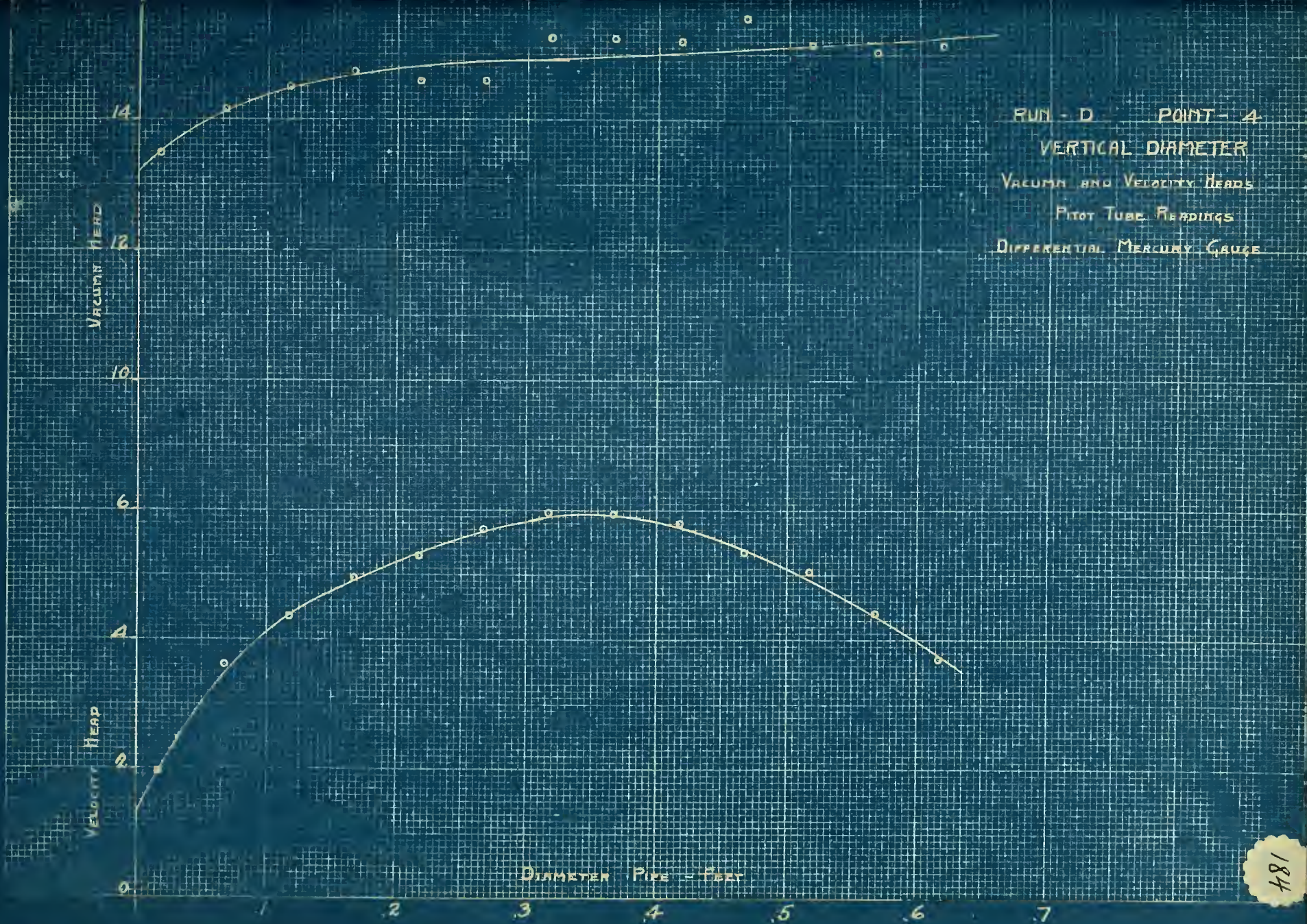

RUN 5 D. POINT 18
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DISTANCE FROM PIPE - FEET
0
2
4
6
8
10
1
2
3
4
5
6
7

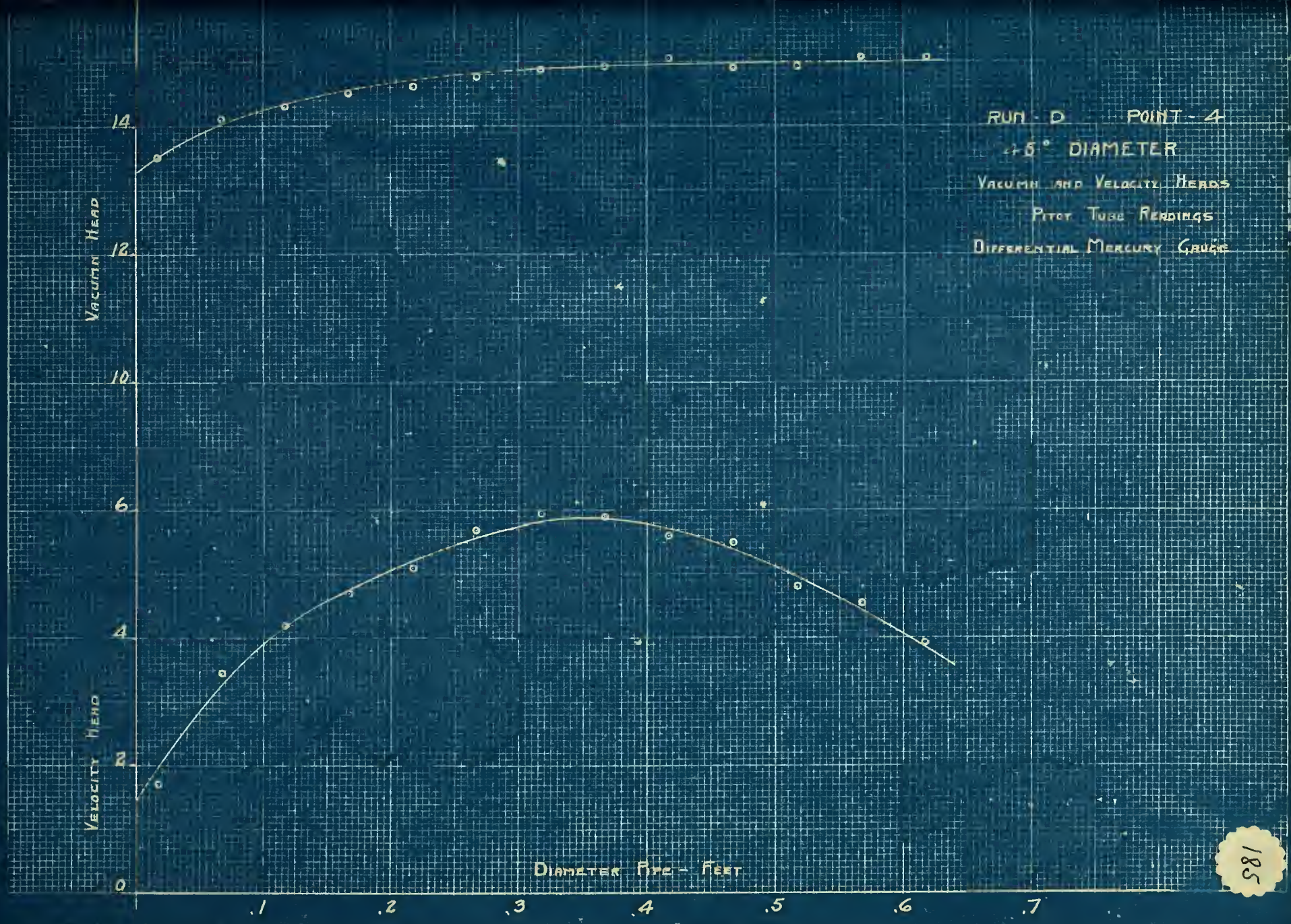

RUN - D POINT - 2
45" DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
0
2
4
6
8
10
.1
.2
.3
.4
.5
.6
.7


RUN - D POINT - 3
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS DIFFERENTIAL
MERCURY GAUGE
PRESSURE HEAD
VELOCITY HEAD
FEET DIAMETER ACROSS PIPE
0
2
4
6
10
12
14
.1
.2
.3
.4
.5
.6

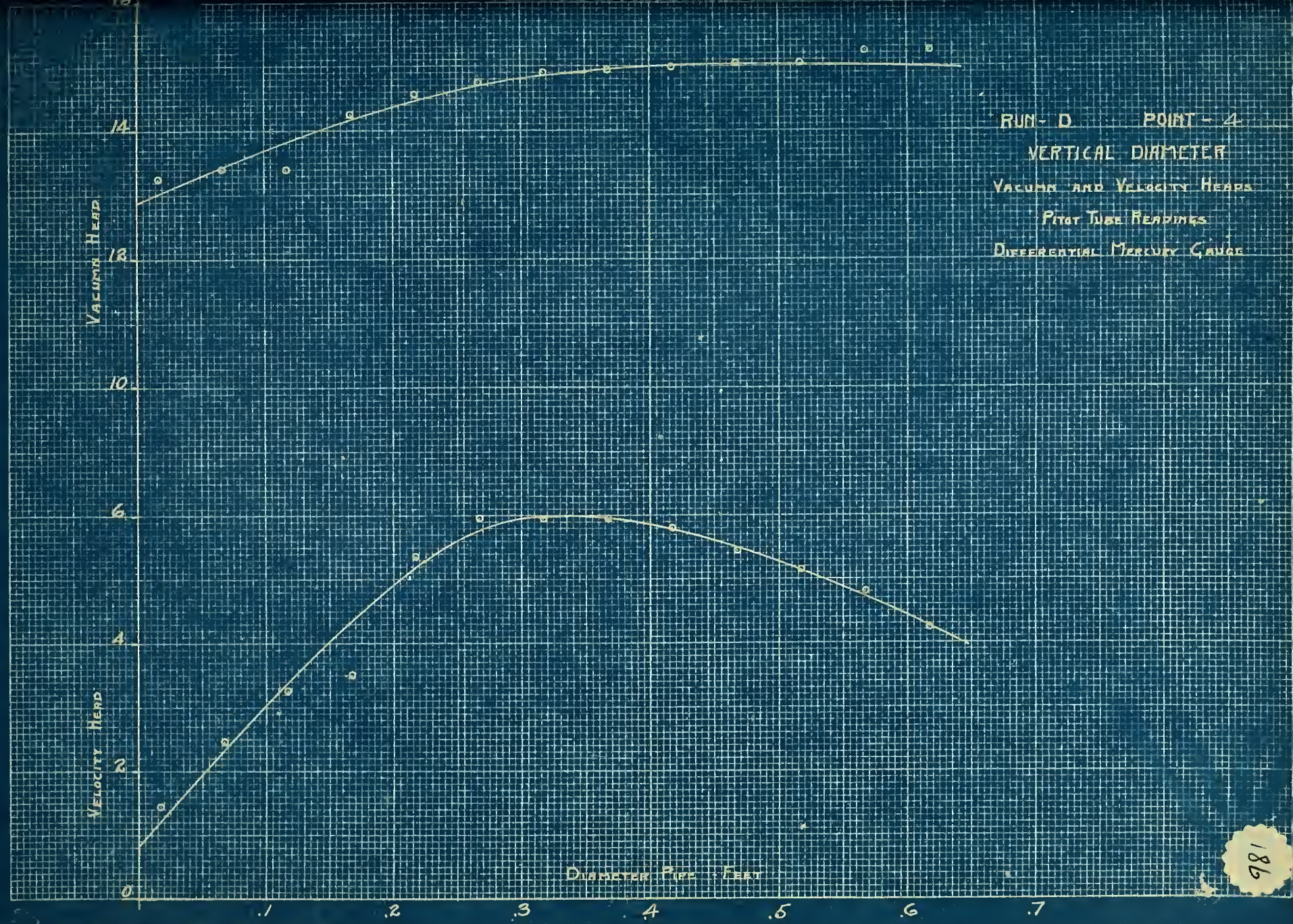

RUN - D POINT - 3
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
0
2
4
6
10
12
14
.1
.2
.3
.4
.5
.6
.7

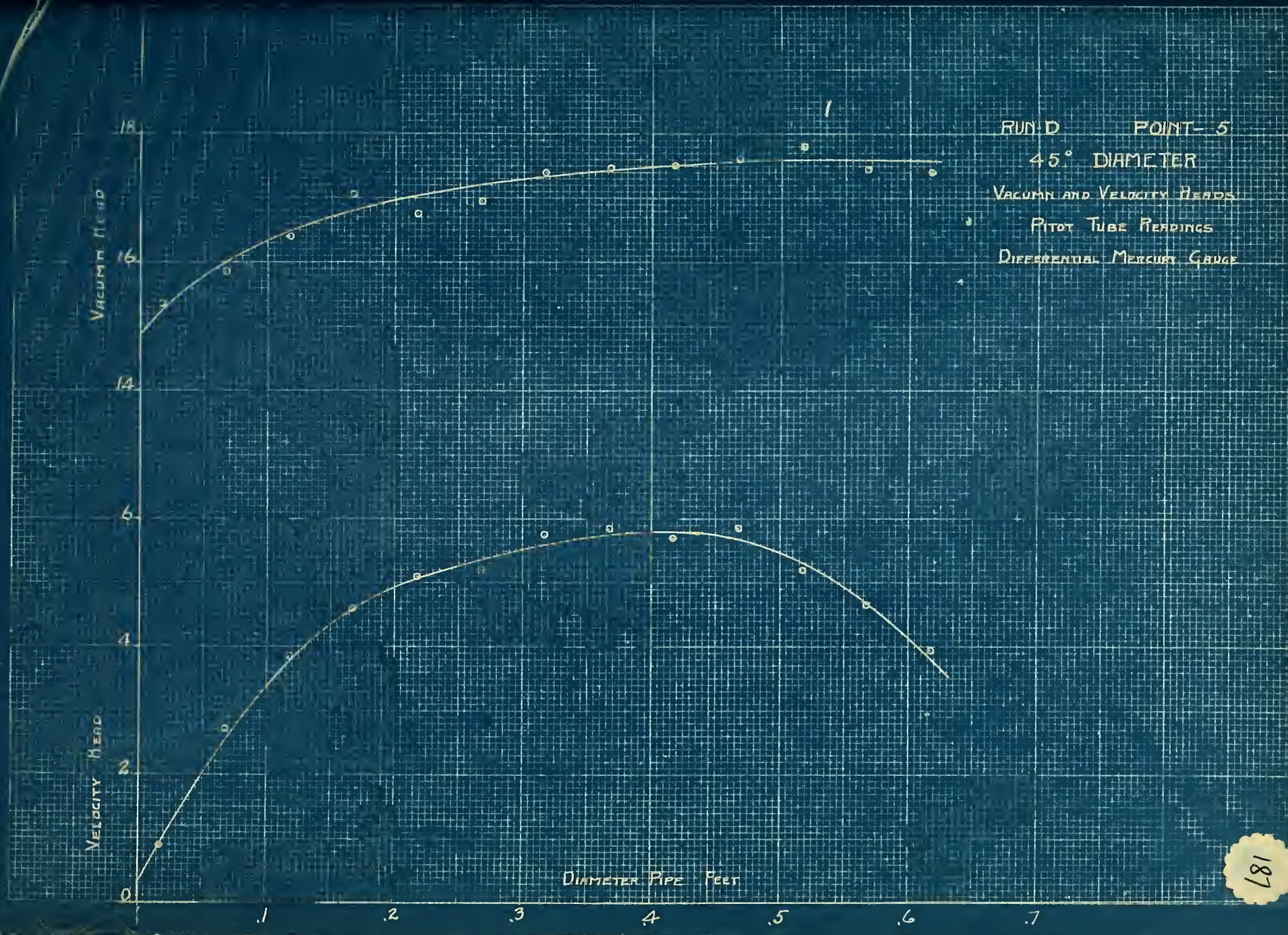

RUN - D POINT - 3
45" DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE FEET
0
2
4
6
10
12
14
.1
.2
.3
.4
.5
.6

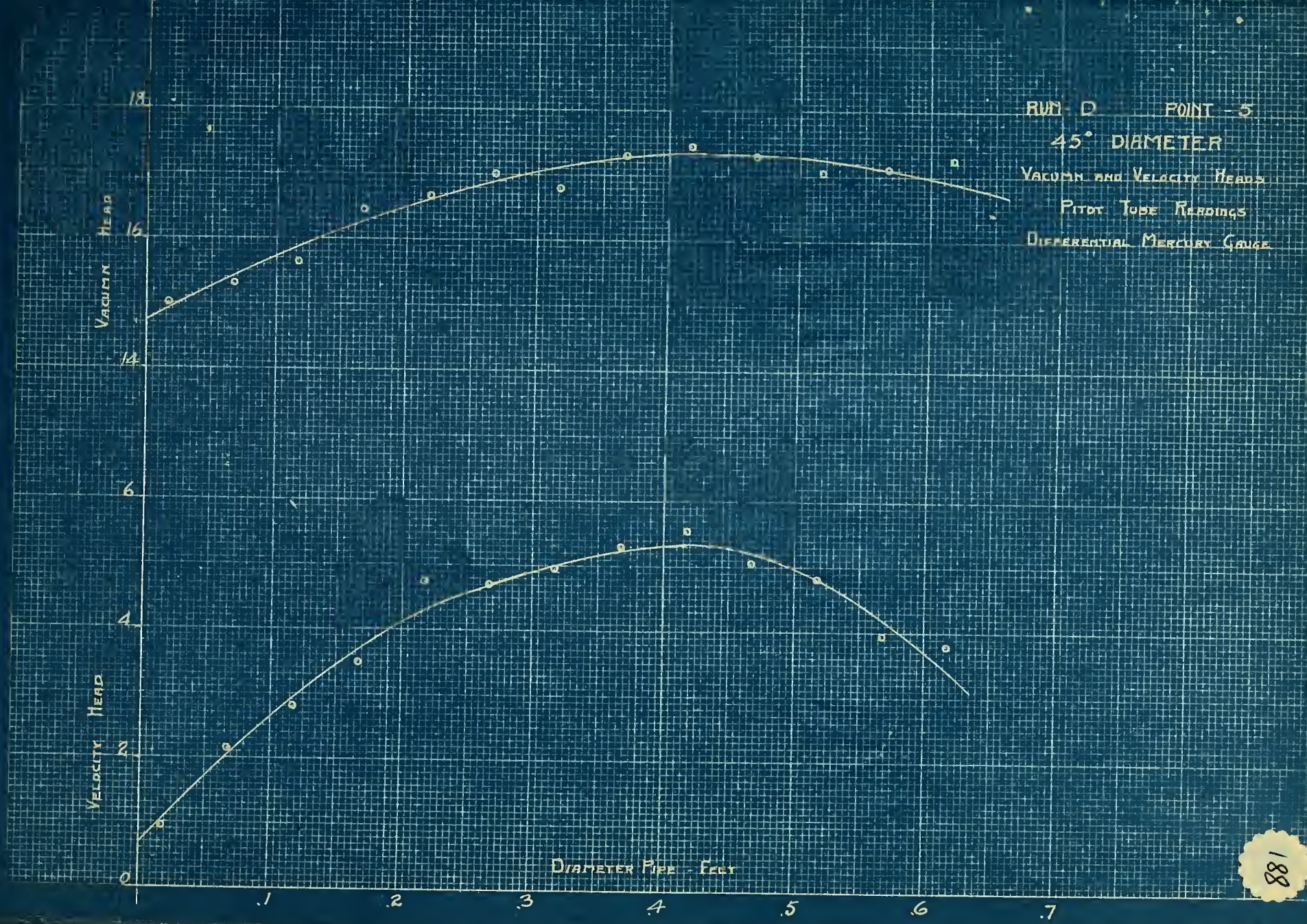

RUN - D POINT - 4
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
0
2
4
6
10
12
14
.1
.2
.3
.4
.5
.6
.7

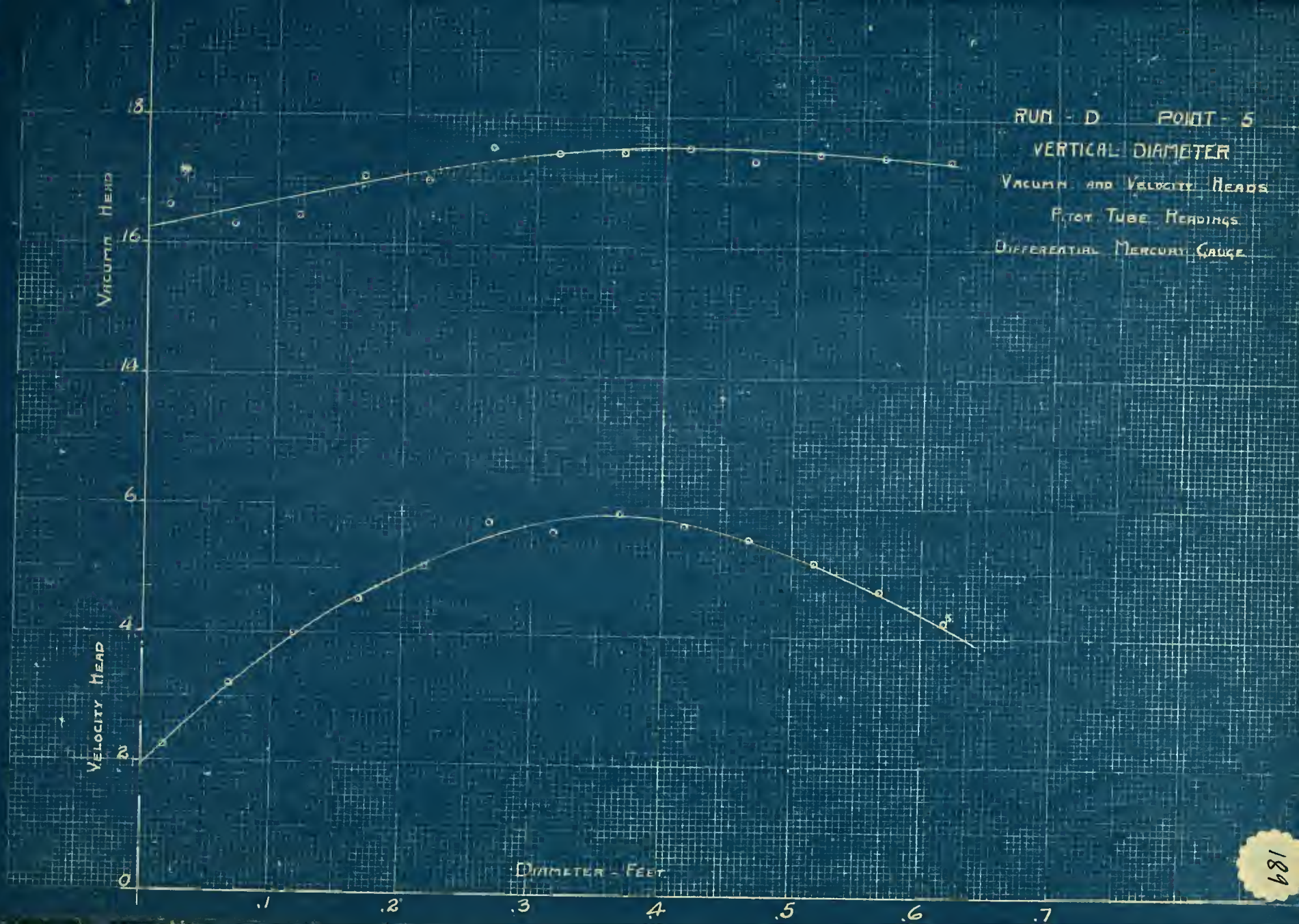

RUN - D POINT - 4
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
0
2
4
6
10
12
14
.1
.2
.3
.4
.5
.6
.7

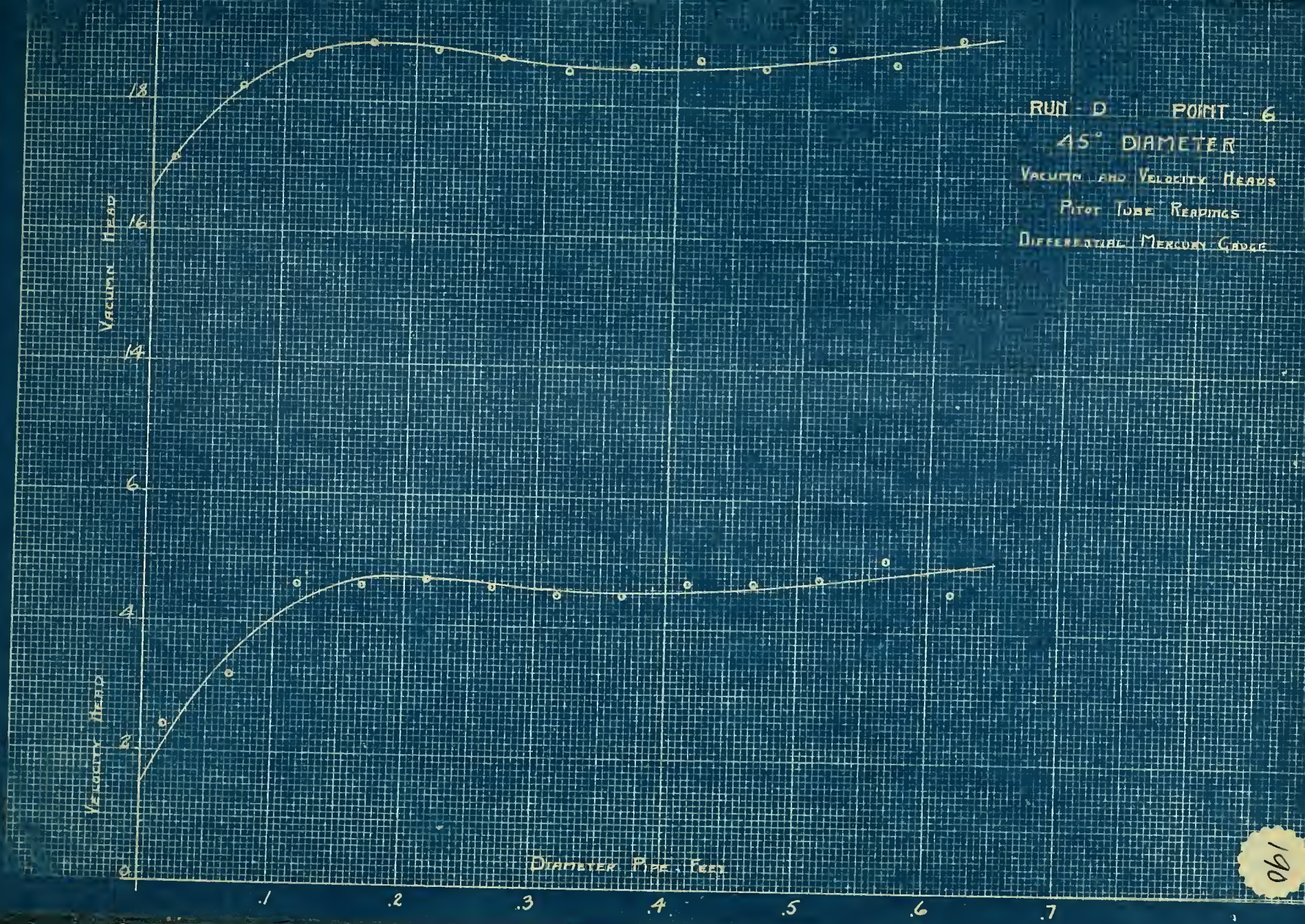
185

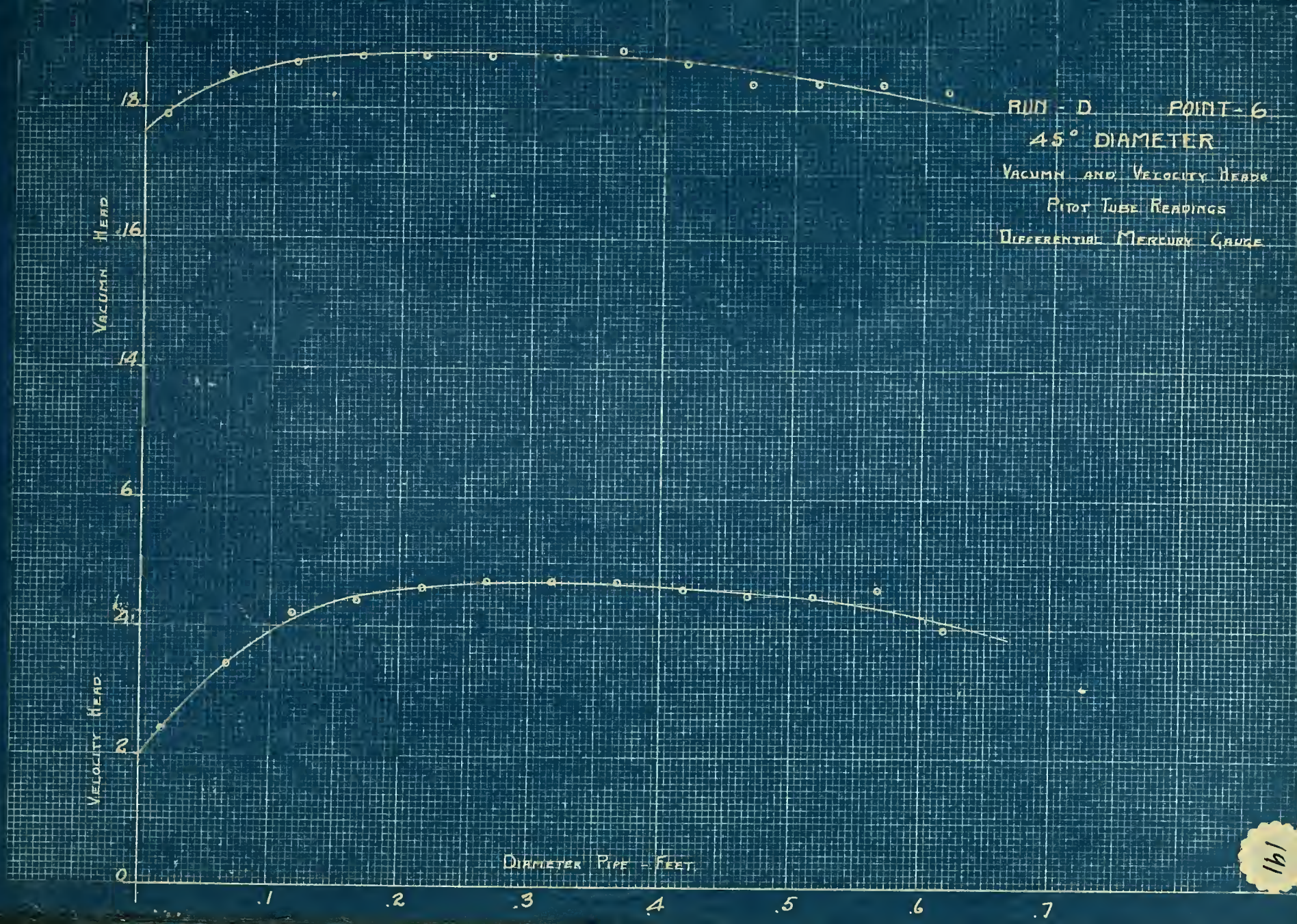

RUN - D POINT - 4
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
14
12
10
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

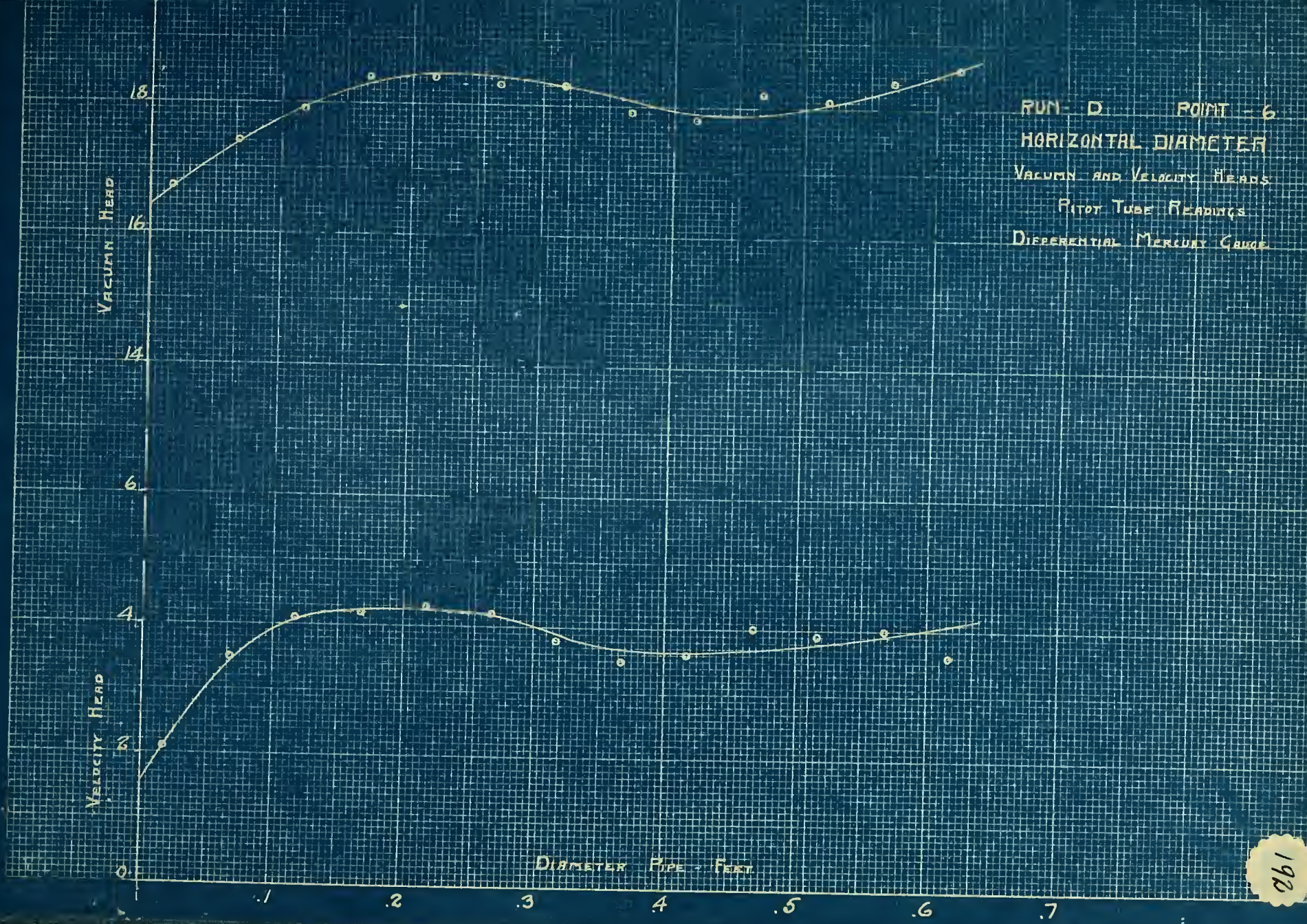

RUN: D POINT- 5
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE FEET
0
2
4
6
14
16
18
.1
.2
.3
.4
.5
.6
.7

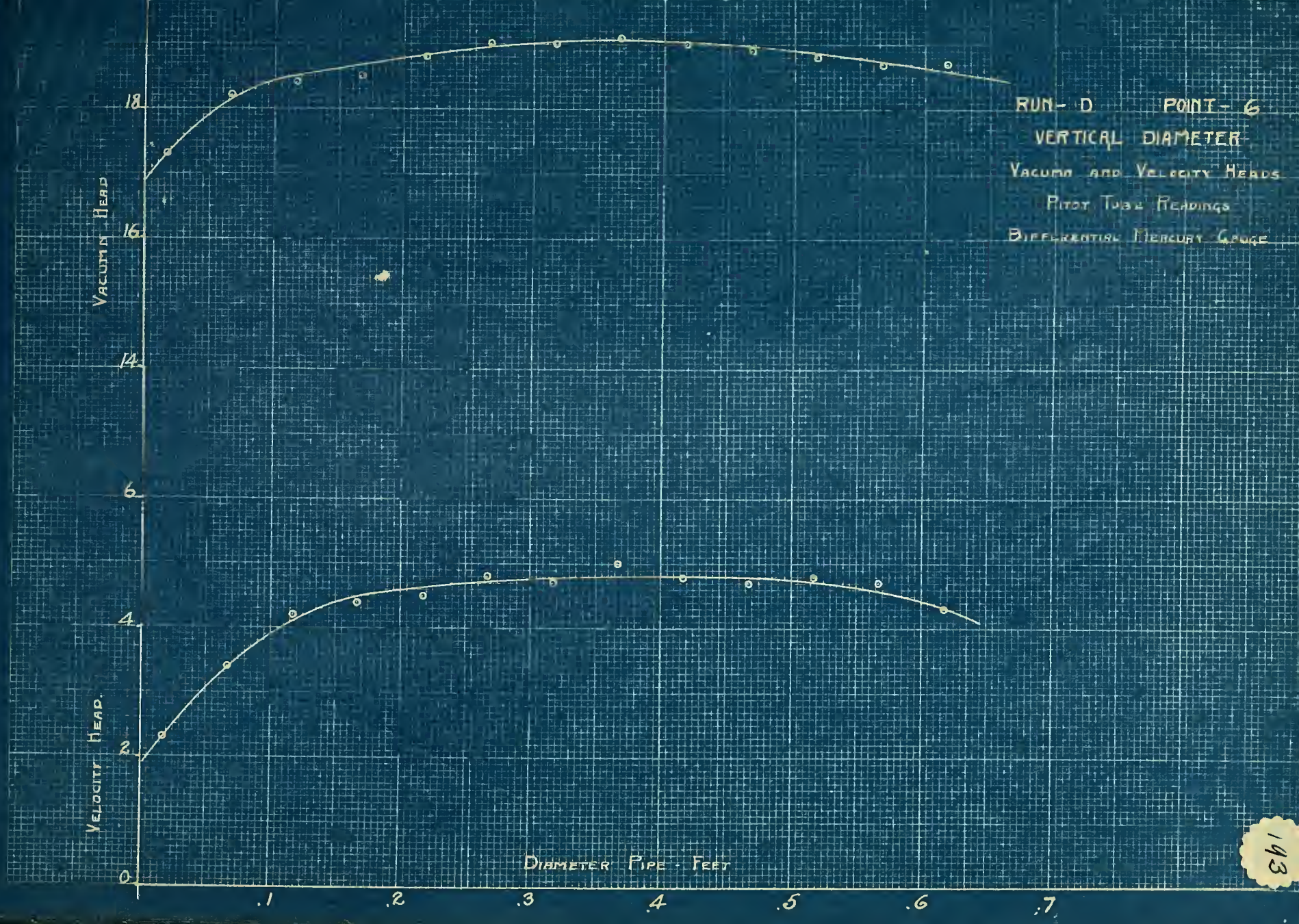

RUN D POINT - 5
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
18
16
14
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

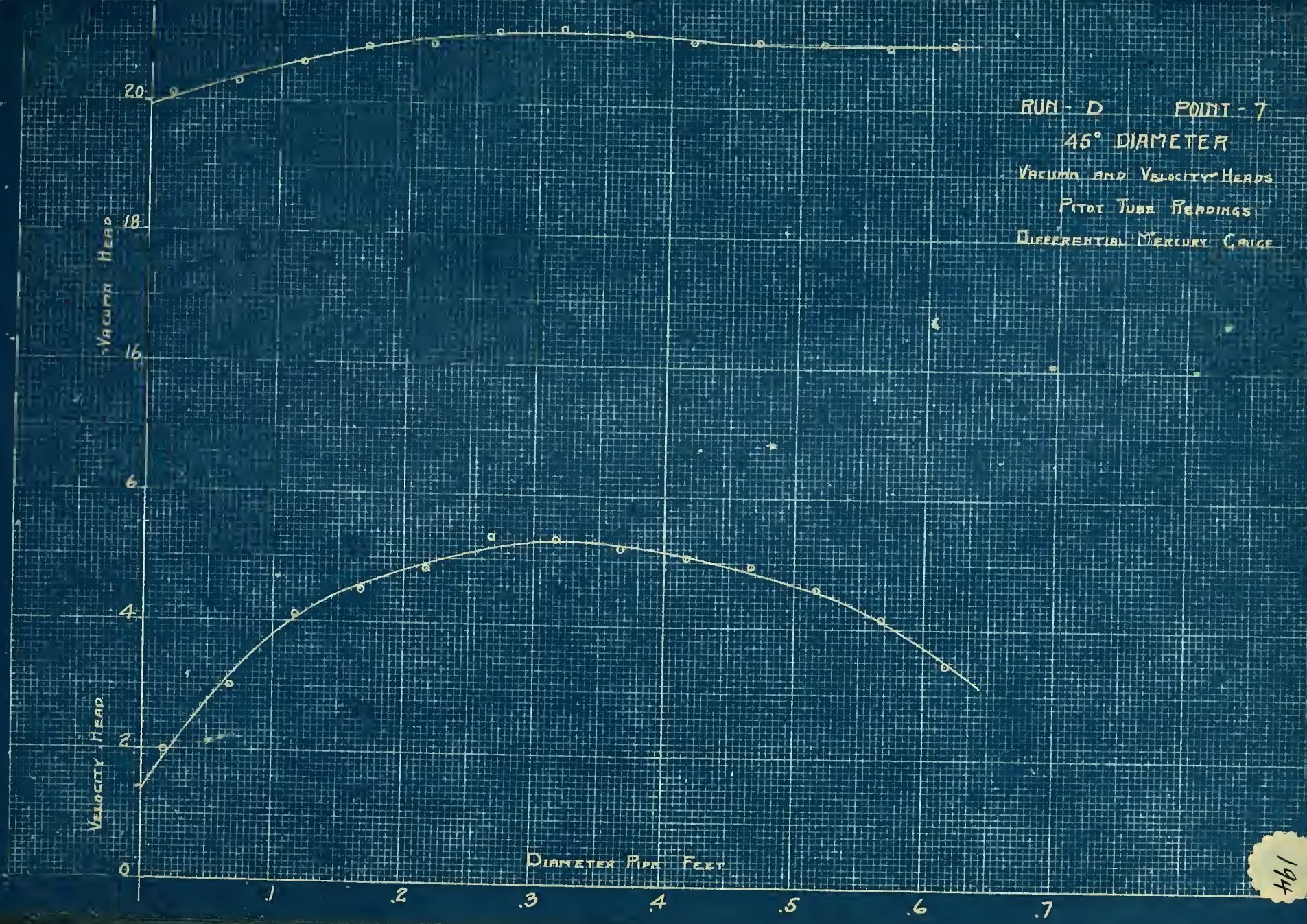

RUN - D POINT - 5
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER - FEET
18
16
14
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

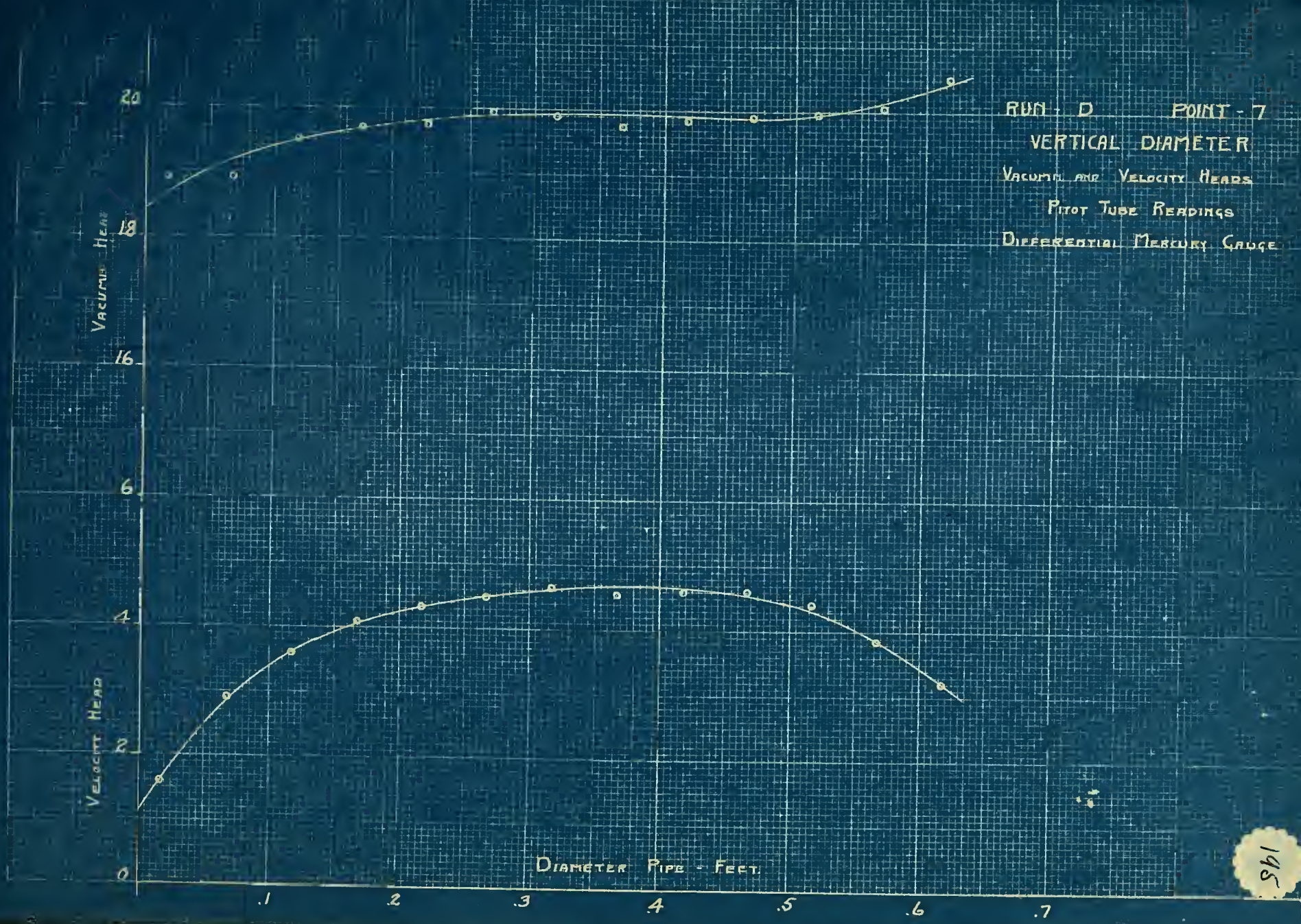

RUN - D POINT - 6
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
18
16
14
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

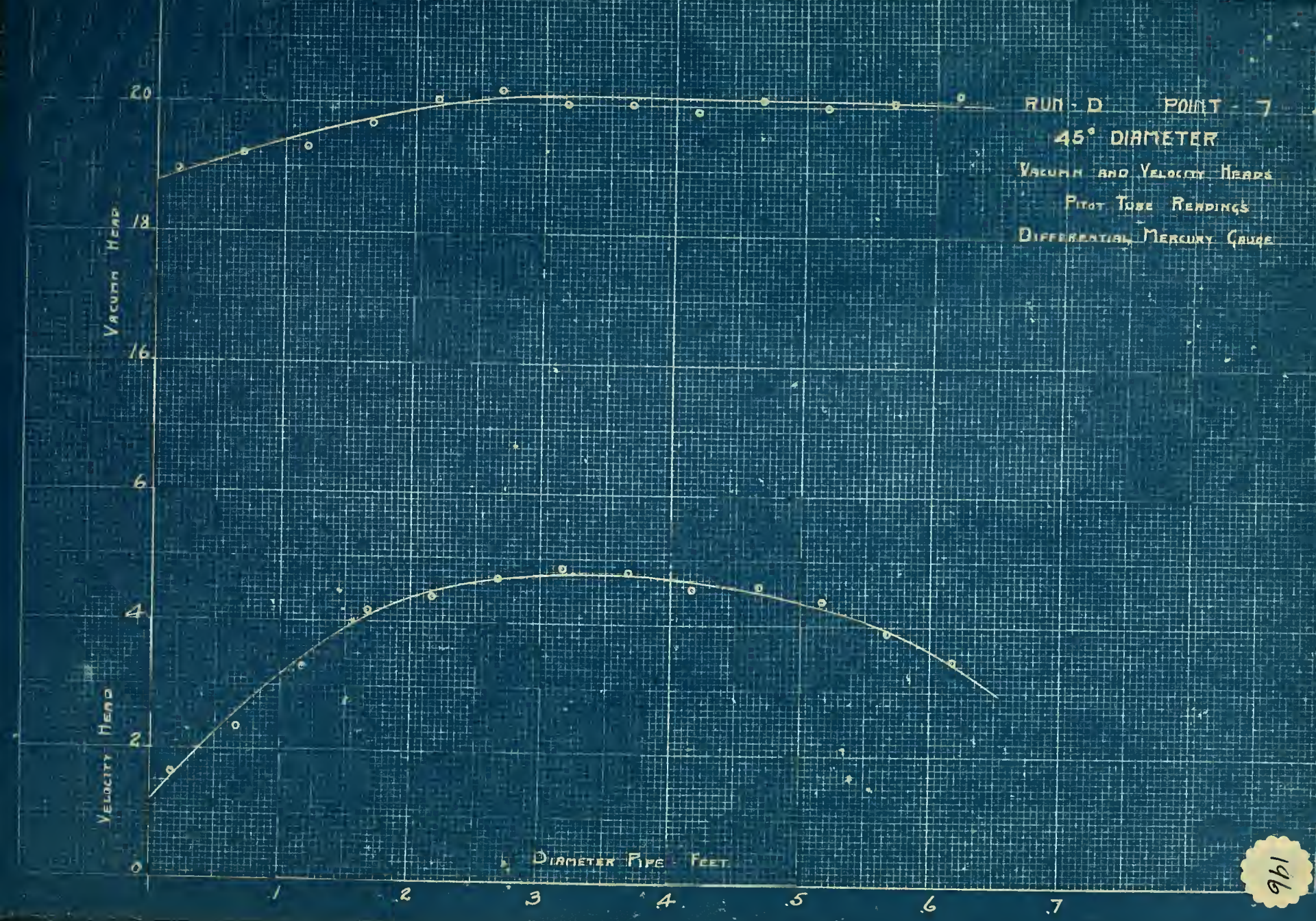

RUN - D POINT - 6
45° DIAMETER
VACUMN AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUMN HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
18
16
14
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

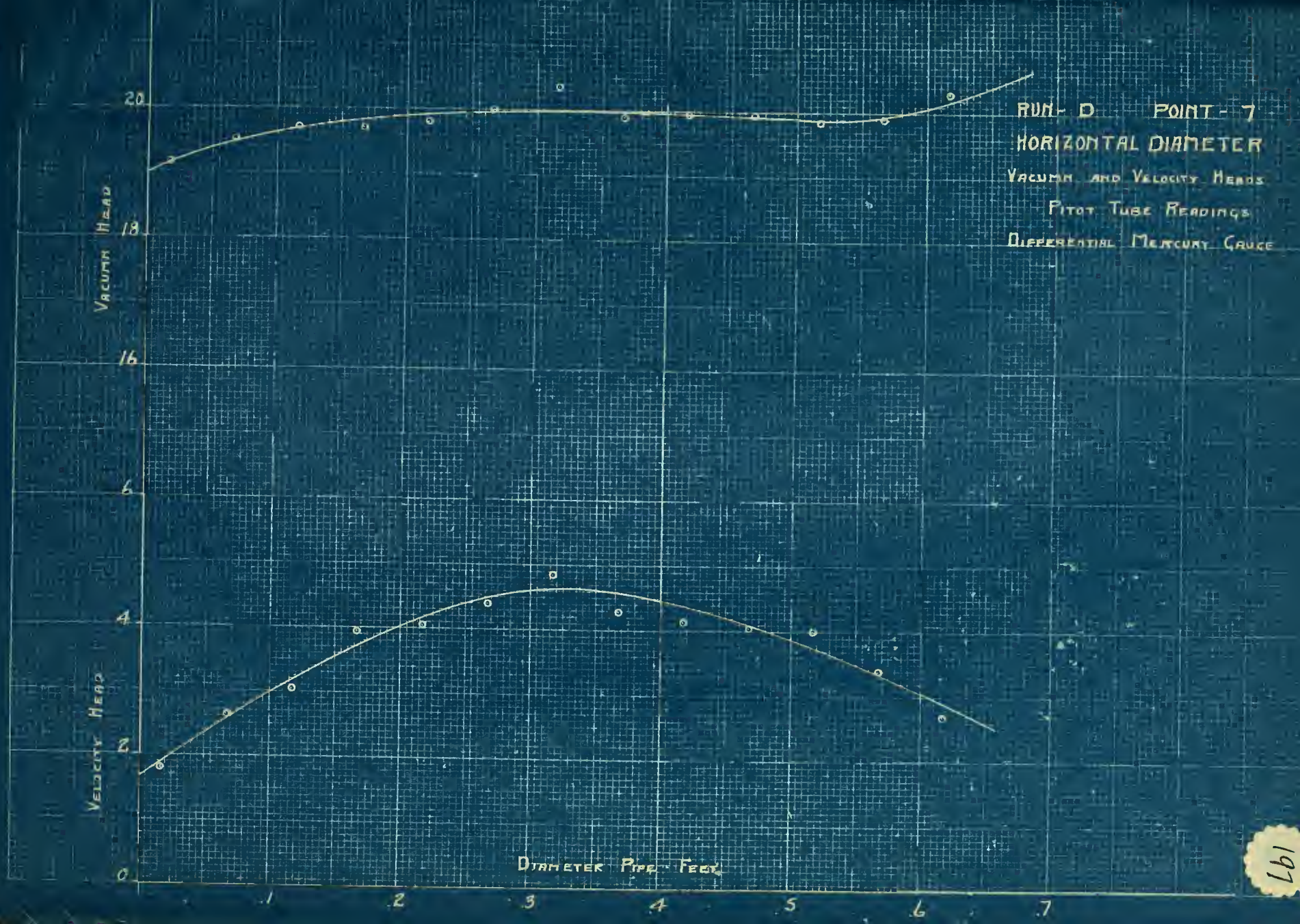

RUN - D POINT - 6
HORIZONTAL DIAMETER
VACUMN AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUMN HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
18
16
14
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

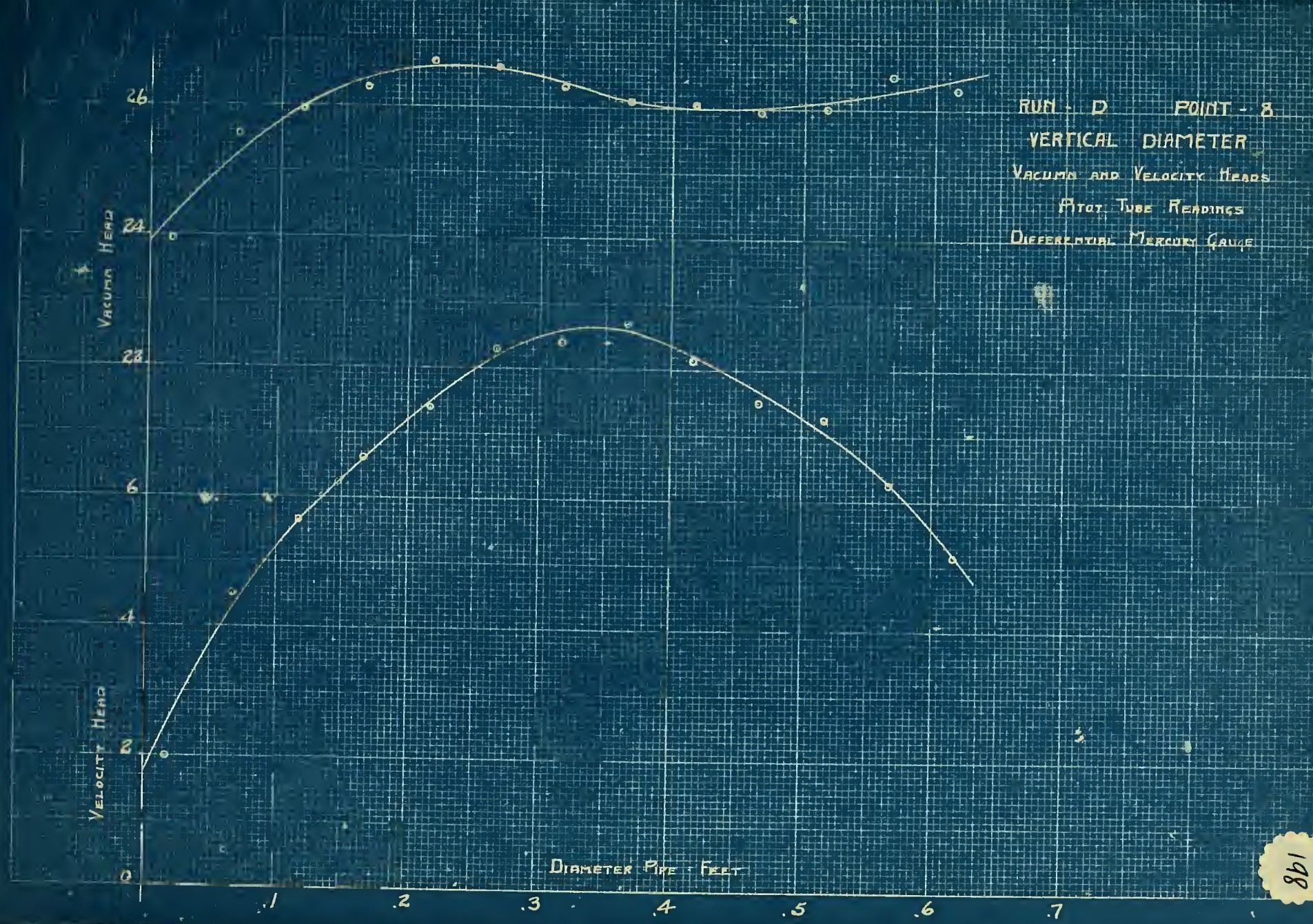

RUN- D POINT- 6
VERTICAL DIAMETER
VACUMM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUMM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
18
16
14
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

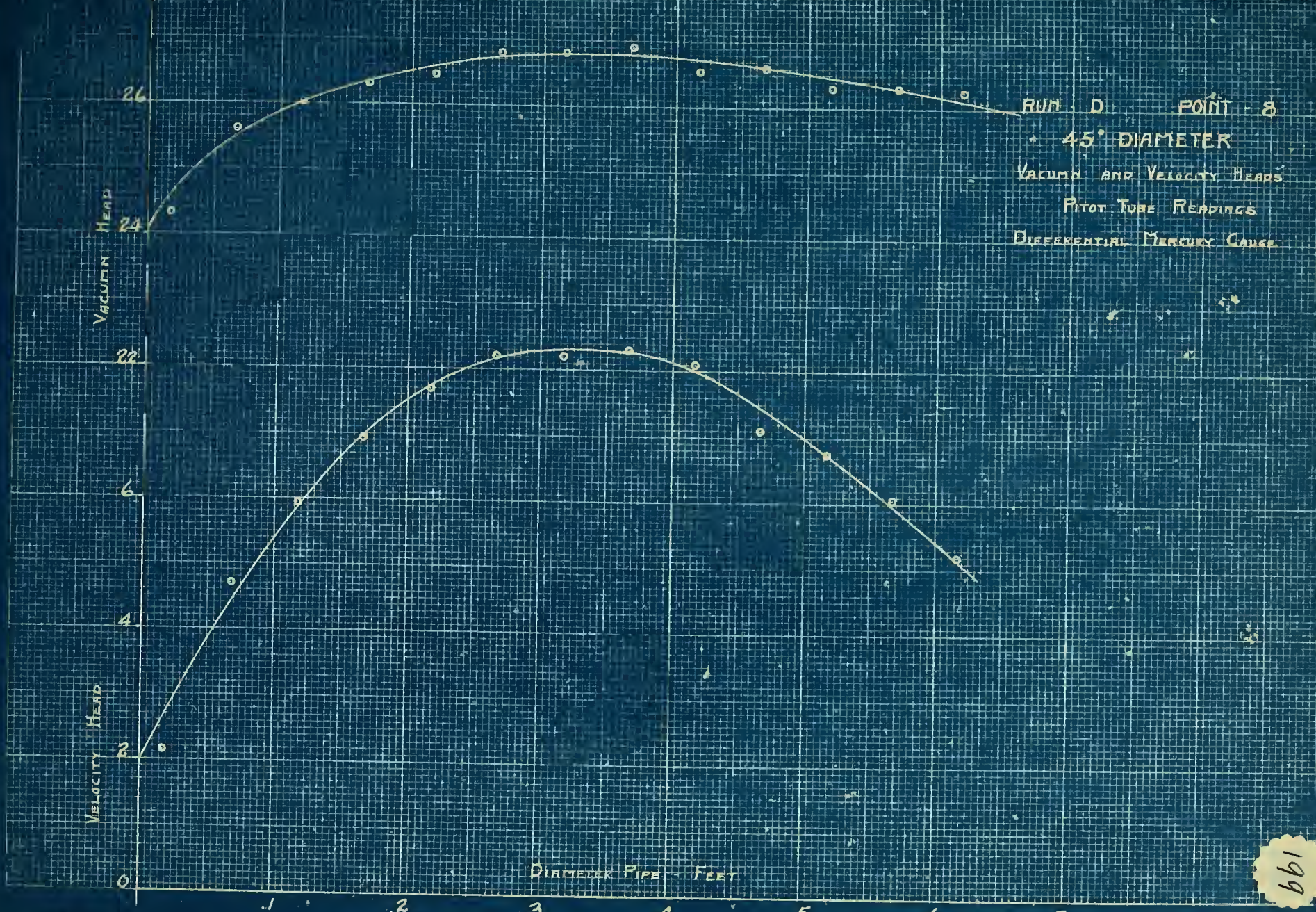

RUN - D POINT - 7
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE FEET
20
18
16
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

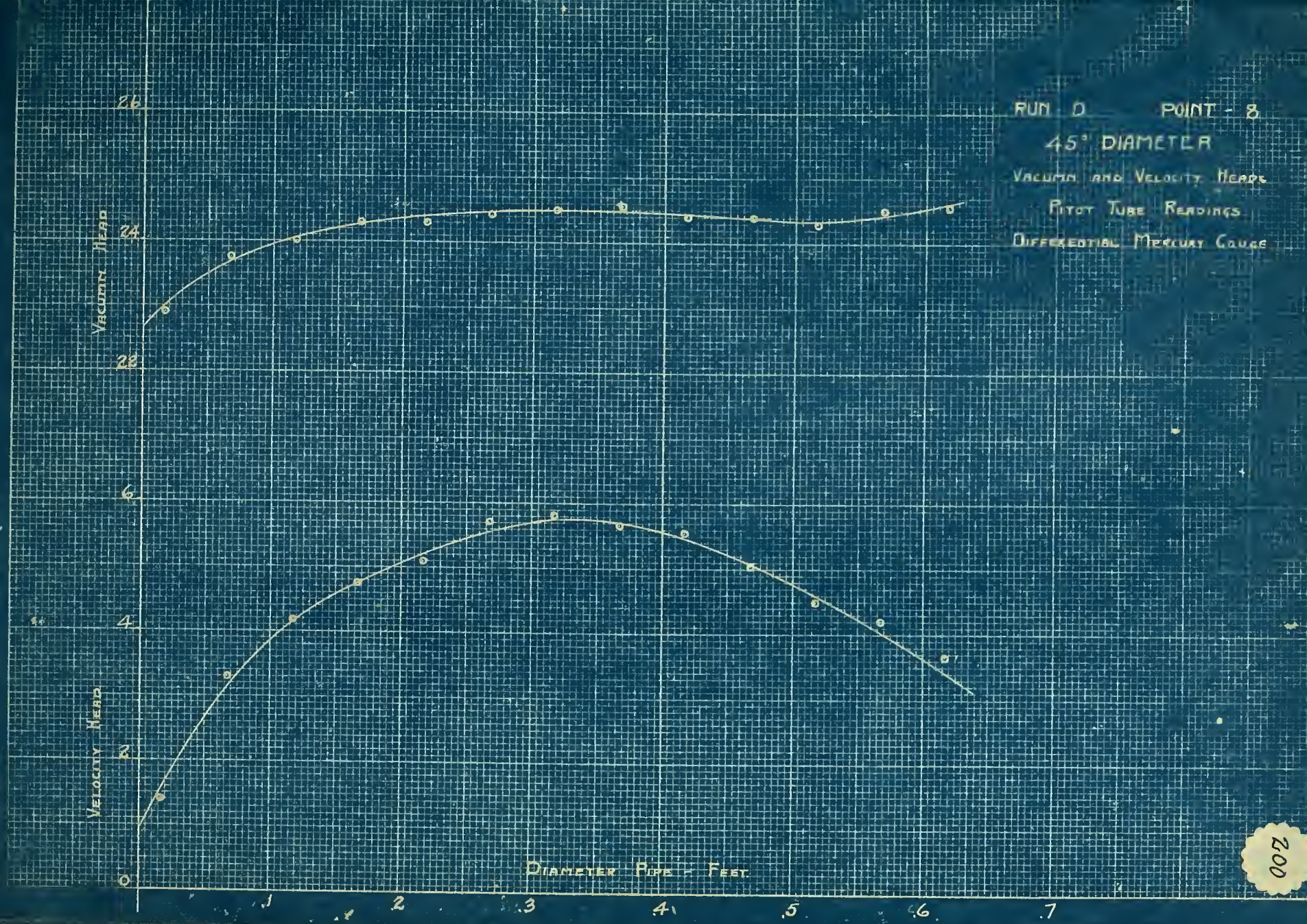

RUN - D POINT - 7
VERTICAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
20
18
16
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

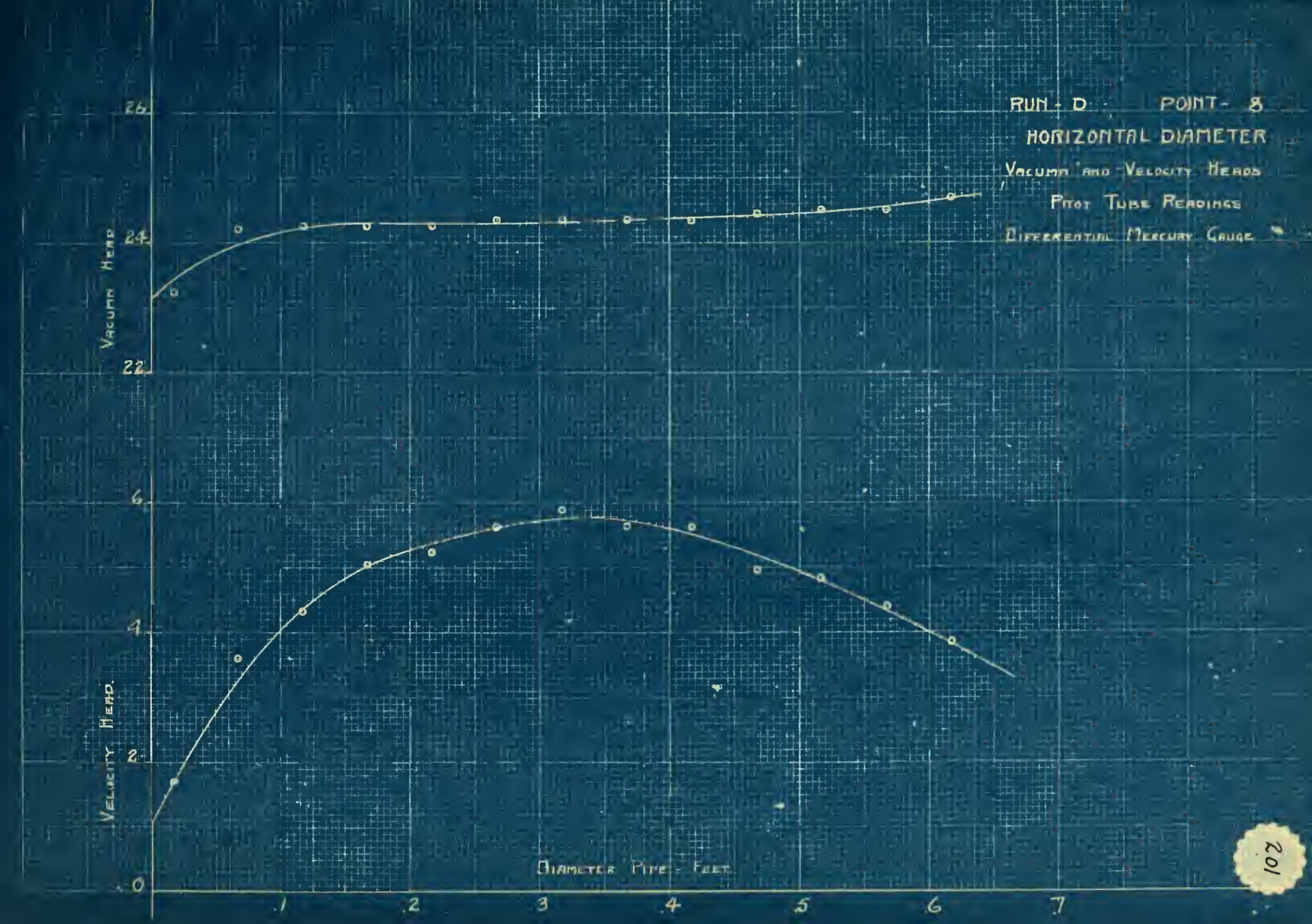

RUN - D POINT - 7
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE FEET
20
18
16
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

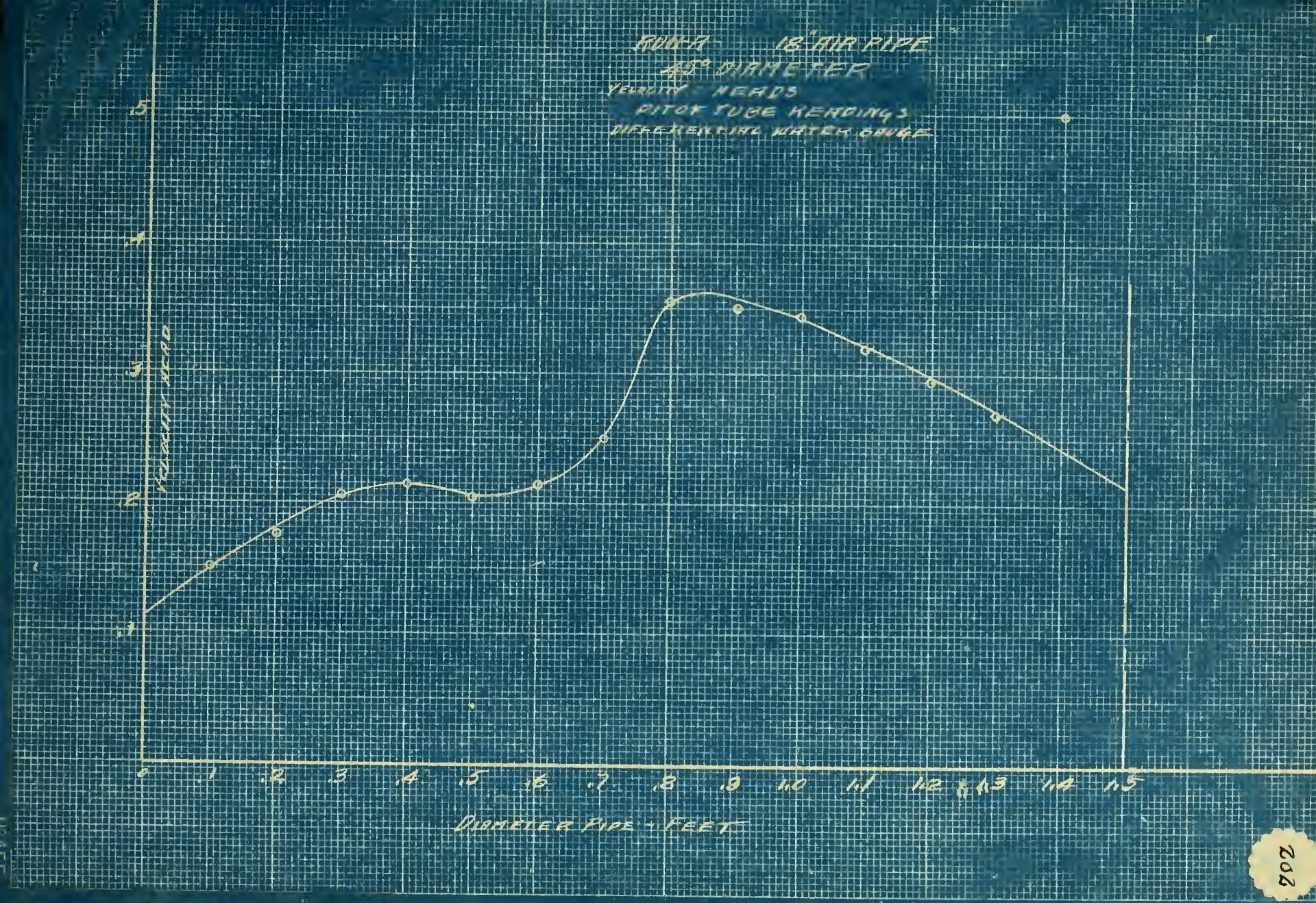

RUN - D POINT - 7
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
20
18
16
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

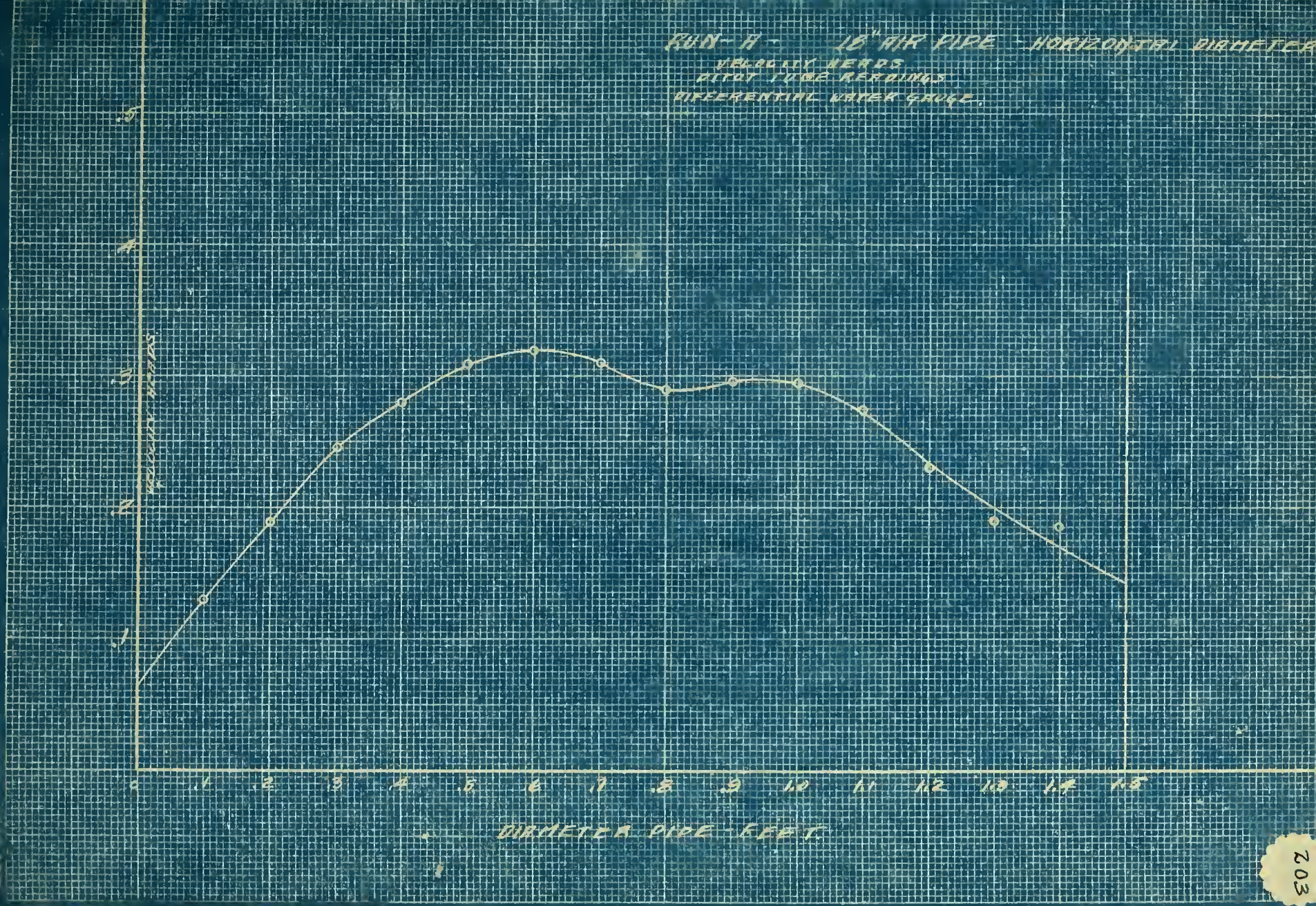

RUN - D POINT - 8
VERTICAL DIAMETER
VACUMA AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUMA HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
26
24
22
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

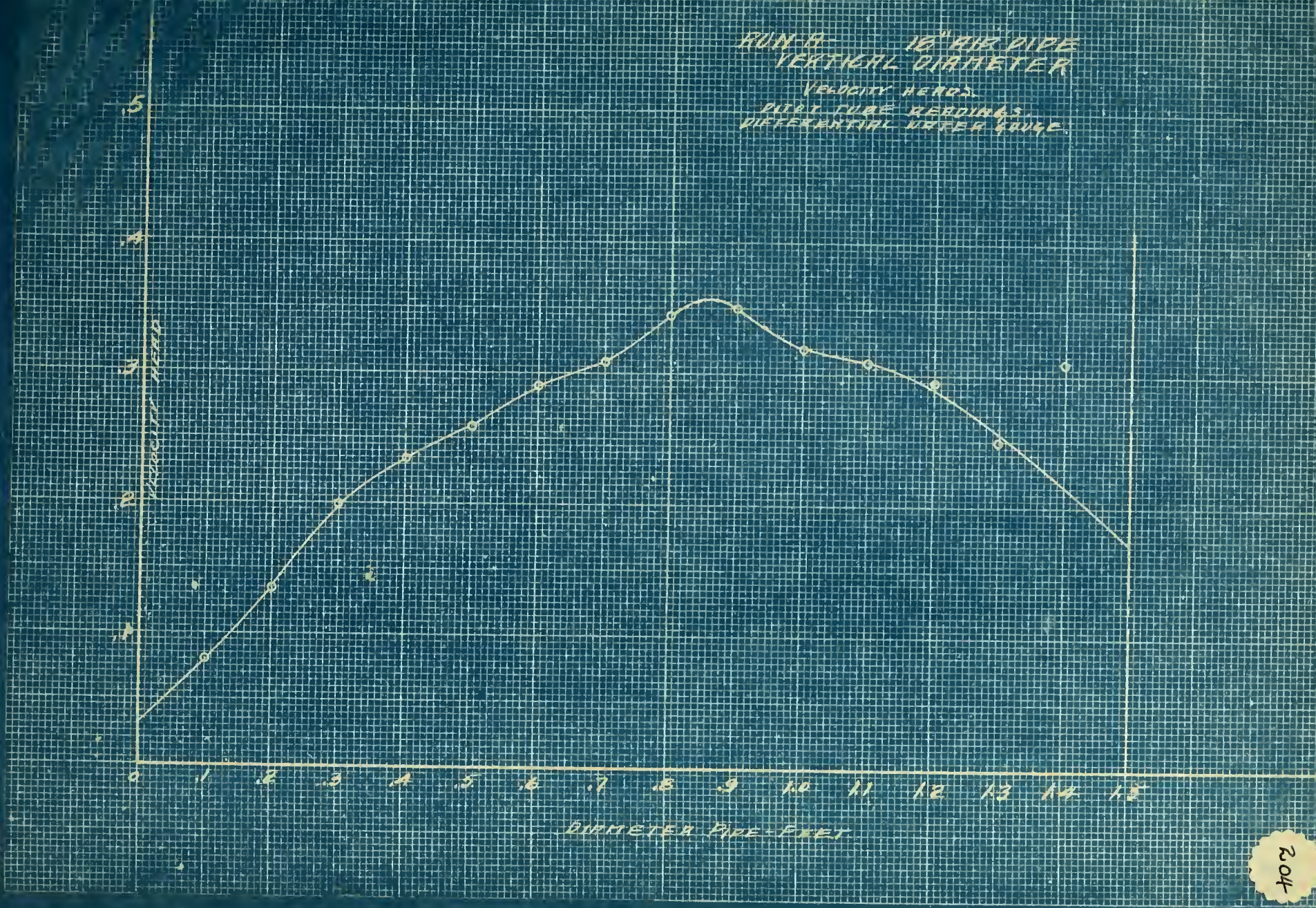

RUN D POINT 8
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
26
24
22
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

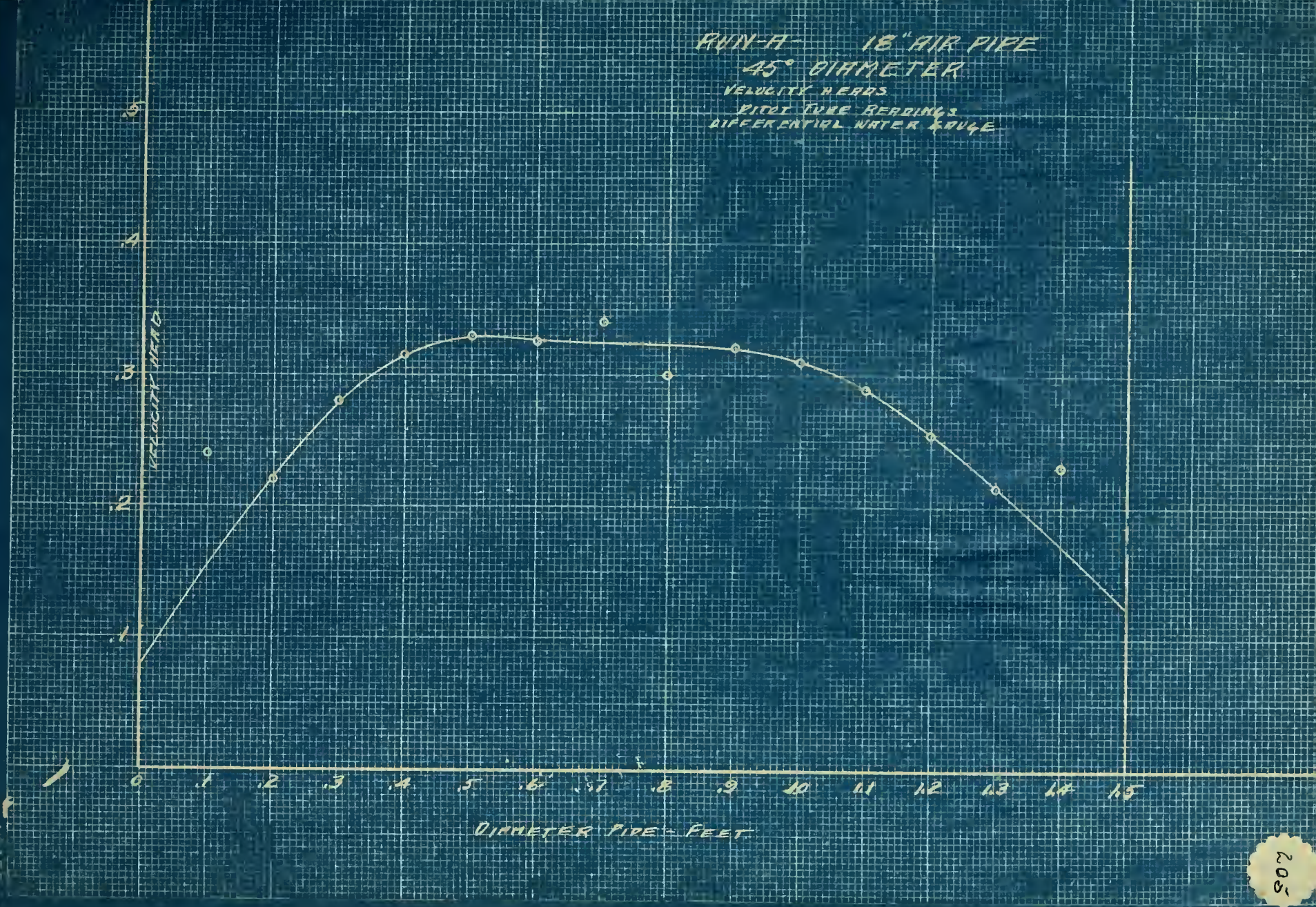

RUN D POINT - 8
45° DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
26
24
22
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

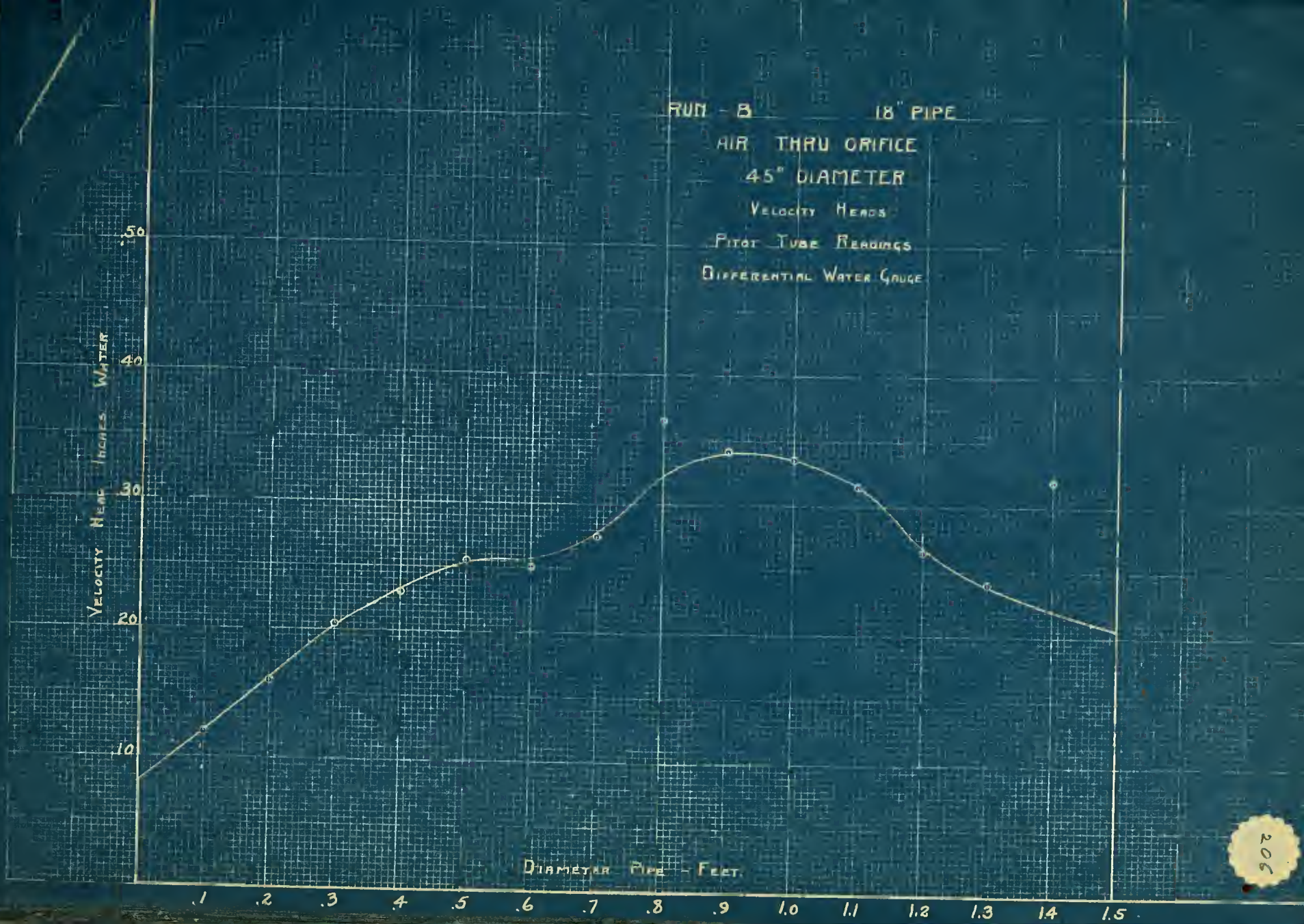

RUN - D POINT - 8
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
VACUUM HEAD
VELOCITY HEAD
DIAMETER PIPE - FEET
26
24
22
6
4
2
0
.1
.2
.3
.4
.5
.6
.7

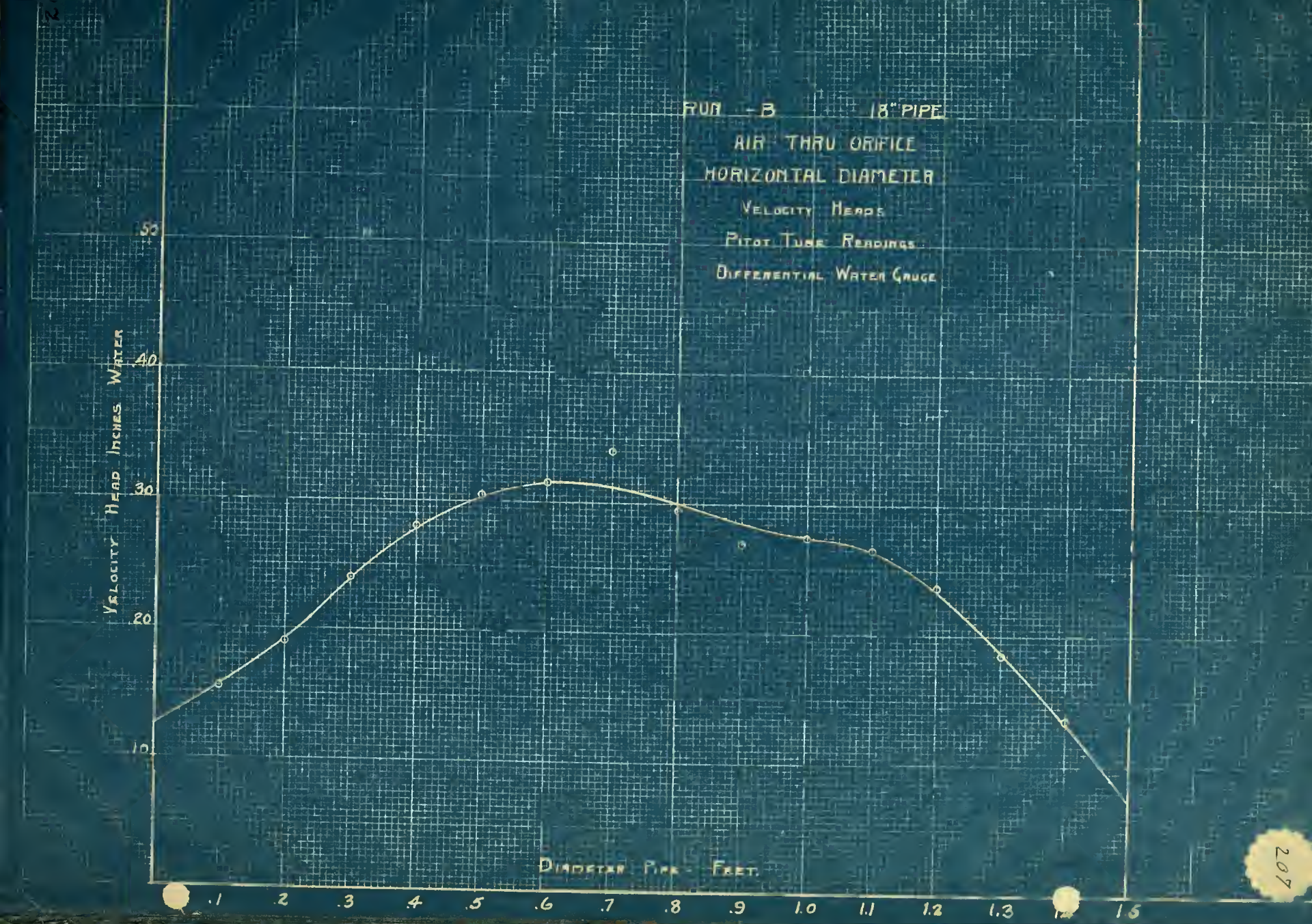

BOSCH 18" AIR PIPE
40° DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
.5
.4
.3
.2
.1
Velocity Heads
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
1.1
1.2
1.3
1.4
1.5
Diameter Pipe - Feet

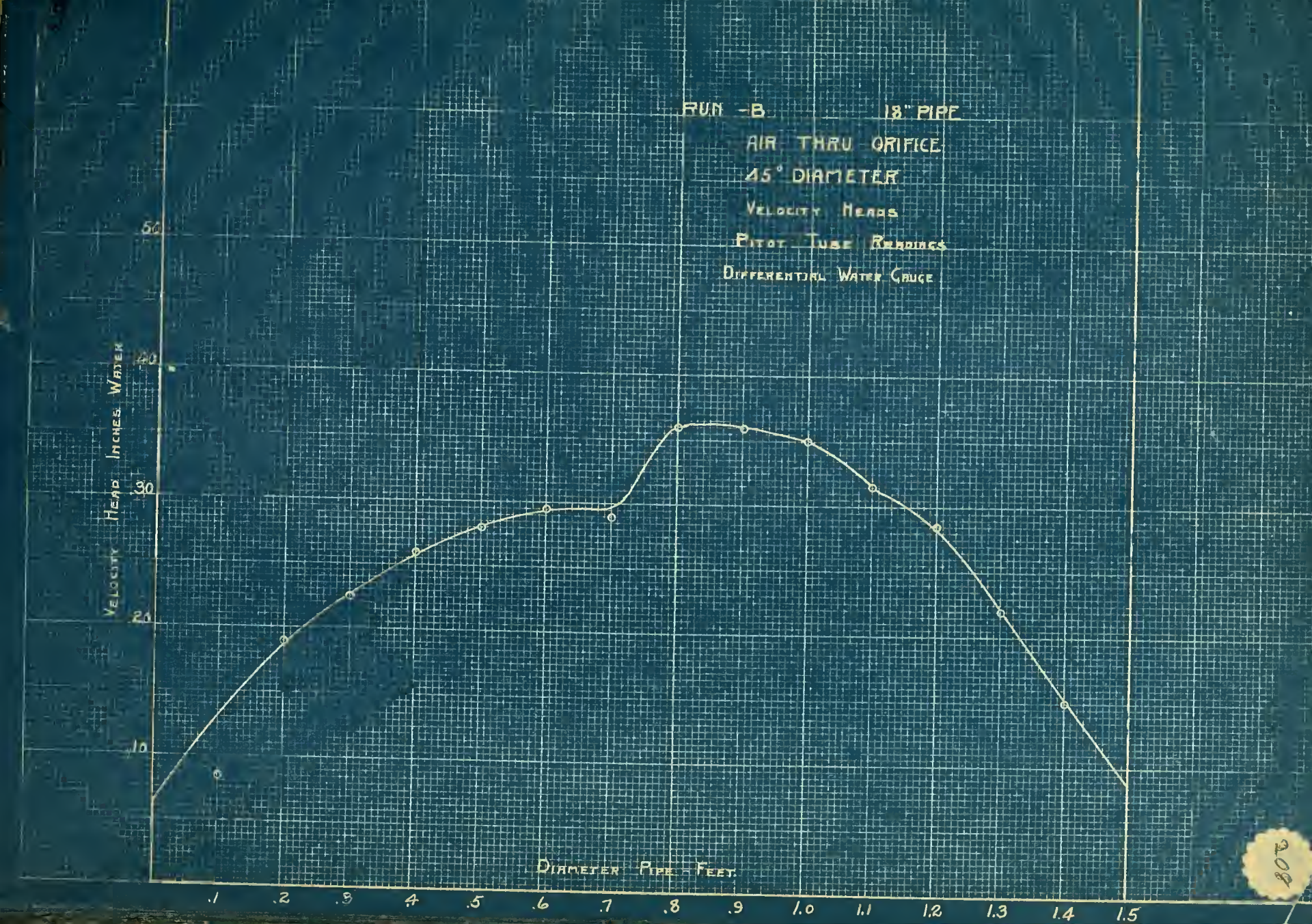

RUN-H - 16" AIR PIPE - HORIZONTAL DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE.
VELOCITY HEADS
.5
.4
.3
.2
.1
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
1.1
1.2
1.3
1.4
1.5
DIAMETER PIPE - FEET.

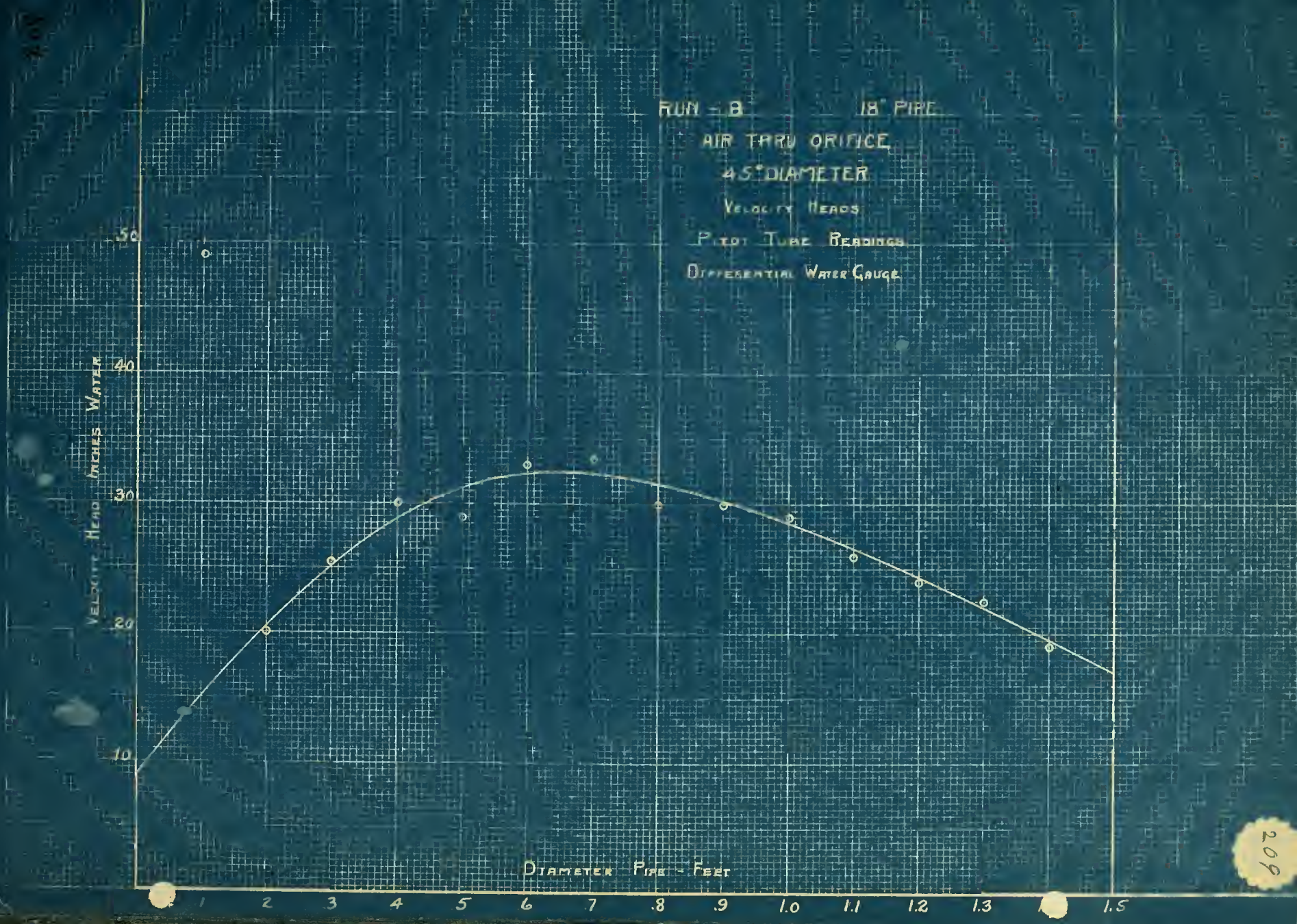

RUN 8 — 18" AIR PIPE
VERTICAL DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
.5
.4
.3
.2
.1
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
1.1
1.2
1.3
1.4
1.5
DIAMETER PIPE - FEET

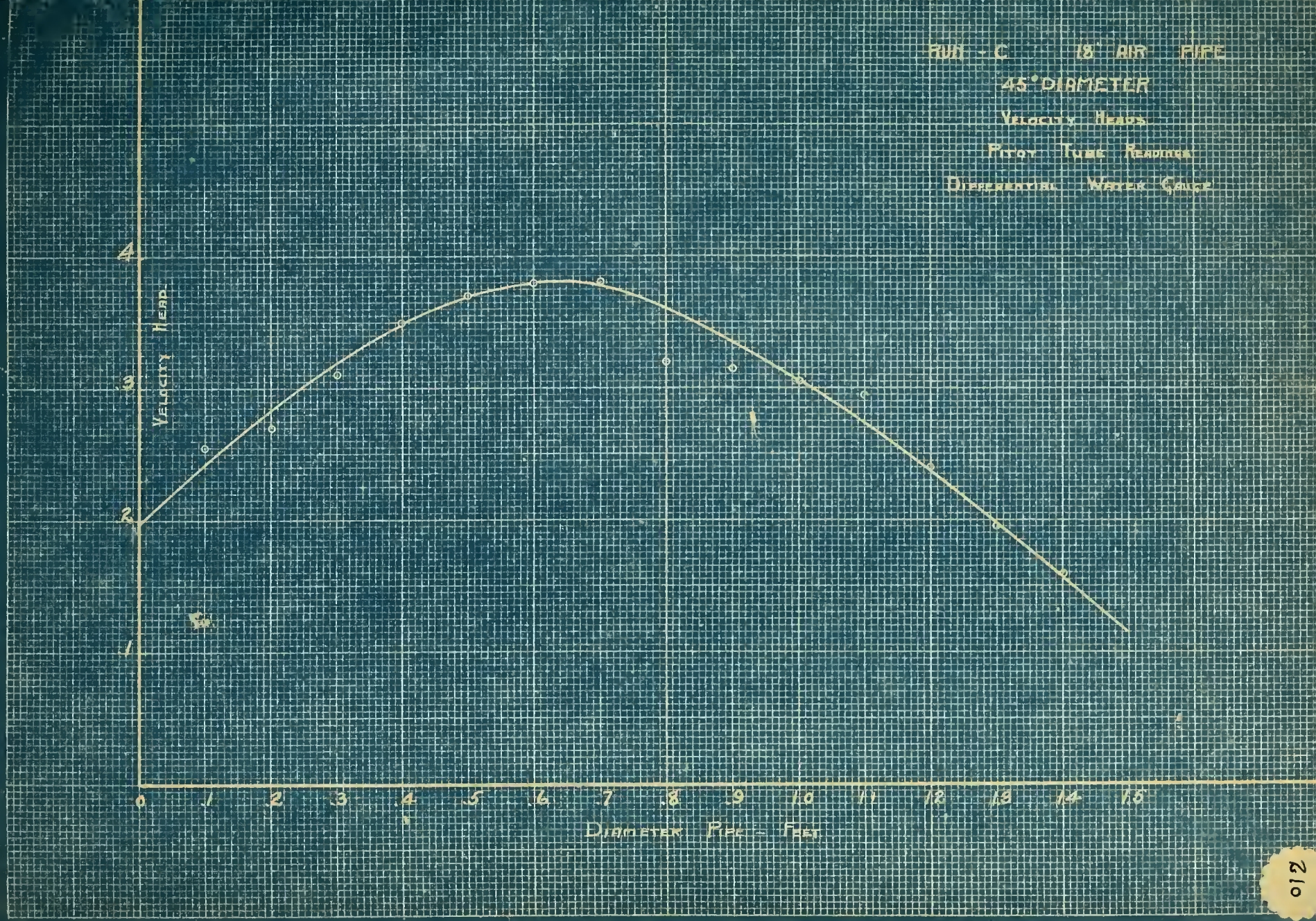

RUN-A- 18" AIR PIPE
45° DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
VELOCITY HEAD
.5
.4
.3
.2
.1
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
1.1
1.2
1.3
1.4
1.5
DIAMETER PIPE - FEET


RUN - B
18" PIPE
AIR THRU ORIFICE
45" DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
VELOCITY HEAD INCHES WATER
.50
.40
.30
.20
.10
DIAMETER PIPE - FEET
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
1.1
1.2
1.3
1.4
1.5


RUN - B 18" PIPE
AIR THRU ORIFICE
HORIZONTAL DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
VELOCITY HEAD INCHES WATER
.50
.40
.30
.20
.10
DIAMETER PIPE - FEET
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
1.1
1.2
1.3
1.6

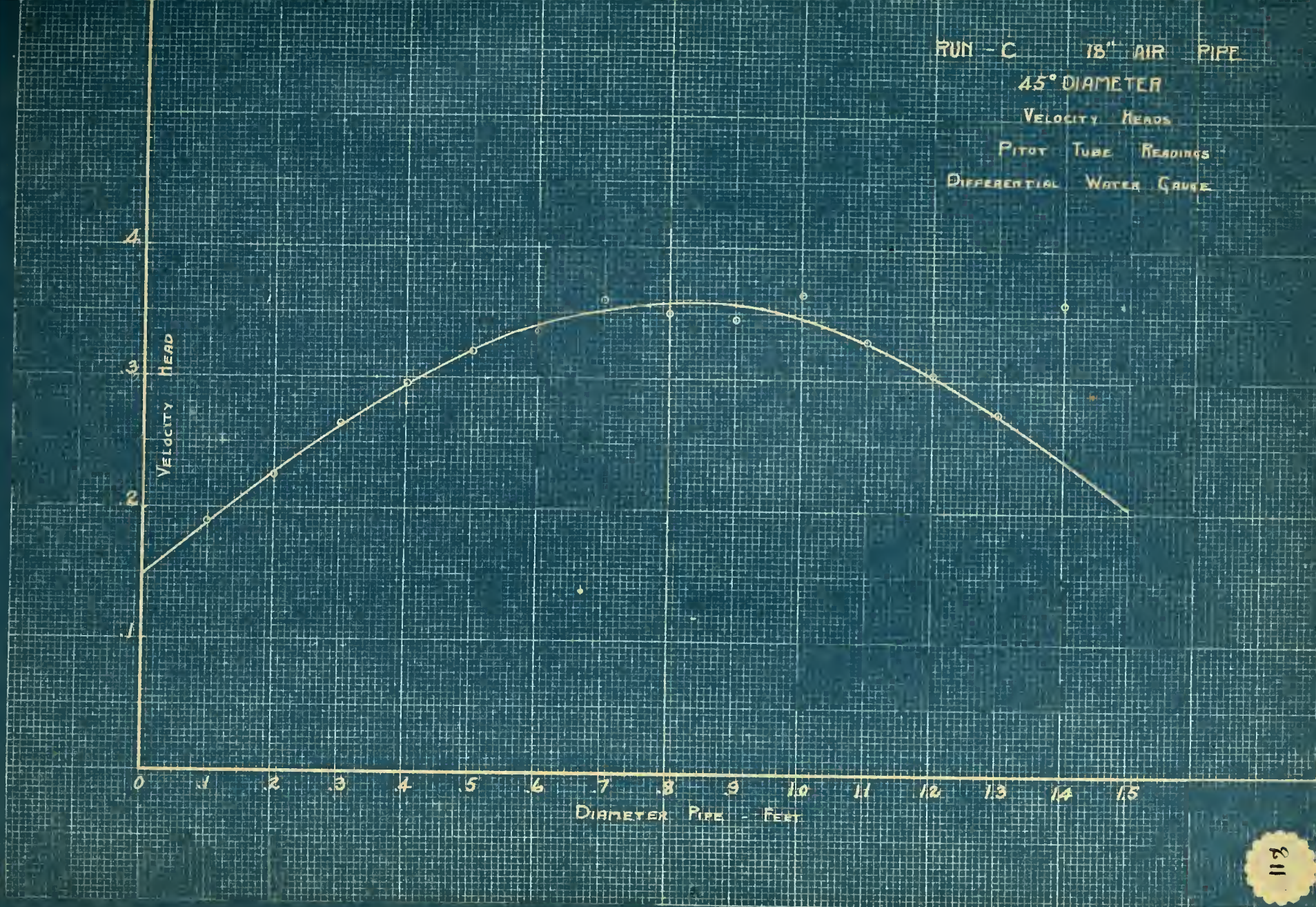

RUN -B 18" PIPE
AIR THRU ORIFICE
.45° DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
VELOCITY HEAD INCHES WATER
50
40
30
20
10
DIAMETER PIPE - FEET
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
1.1
1.2
1.3
1.4
1.5

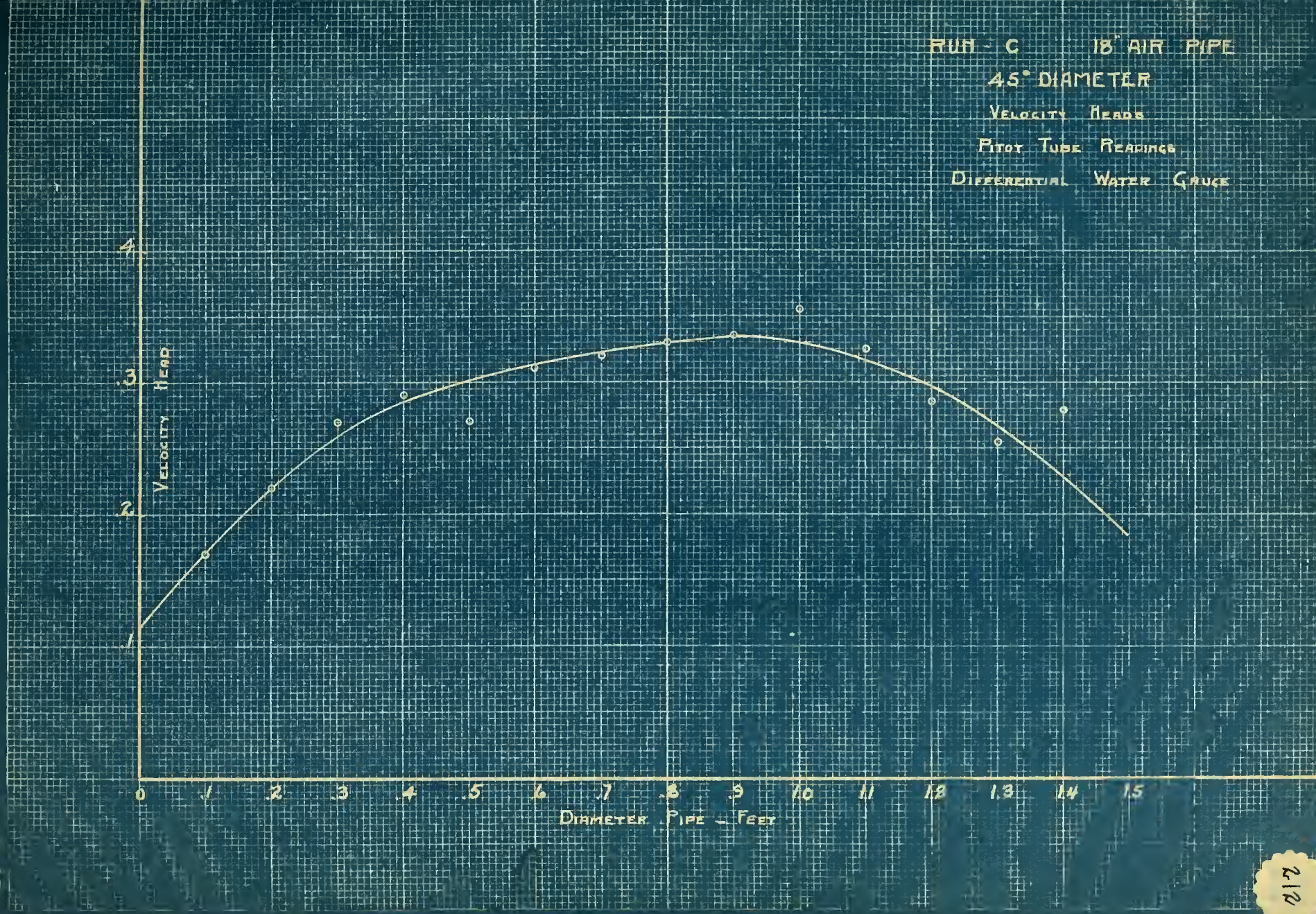

RUN - 8
18" PIPE
AIR THRU ORIFICE
4.5" DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
VELOCITY HEAD INCHES WATER
.50
.40
.30
.20
.10
DIAMETER PIPE - FEET
1
2
3
4
5
6
7
.8
.9
1.0
1.1
1.2
1.3
1.5


RUN - C 18" AIR PIPE
45" DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
VELOCITY HEAD
4
3
2
1
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
DIAMETER PIPE = FEET

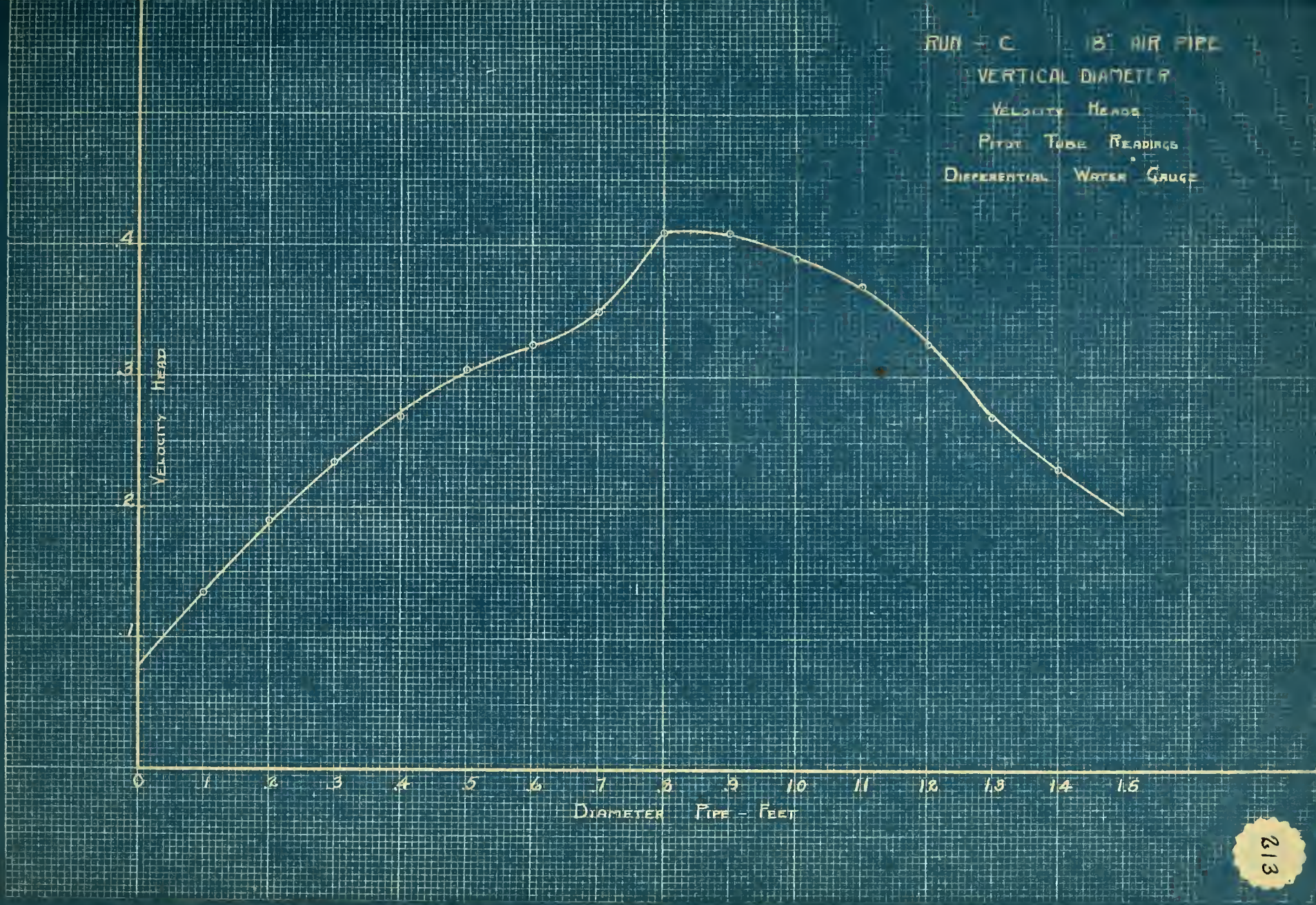
No 455

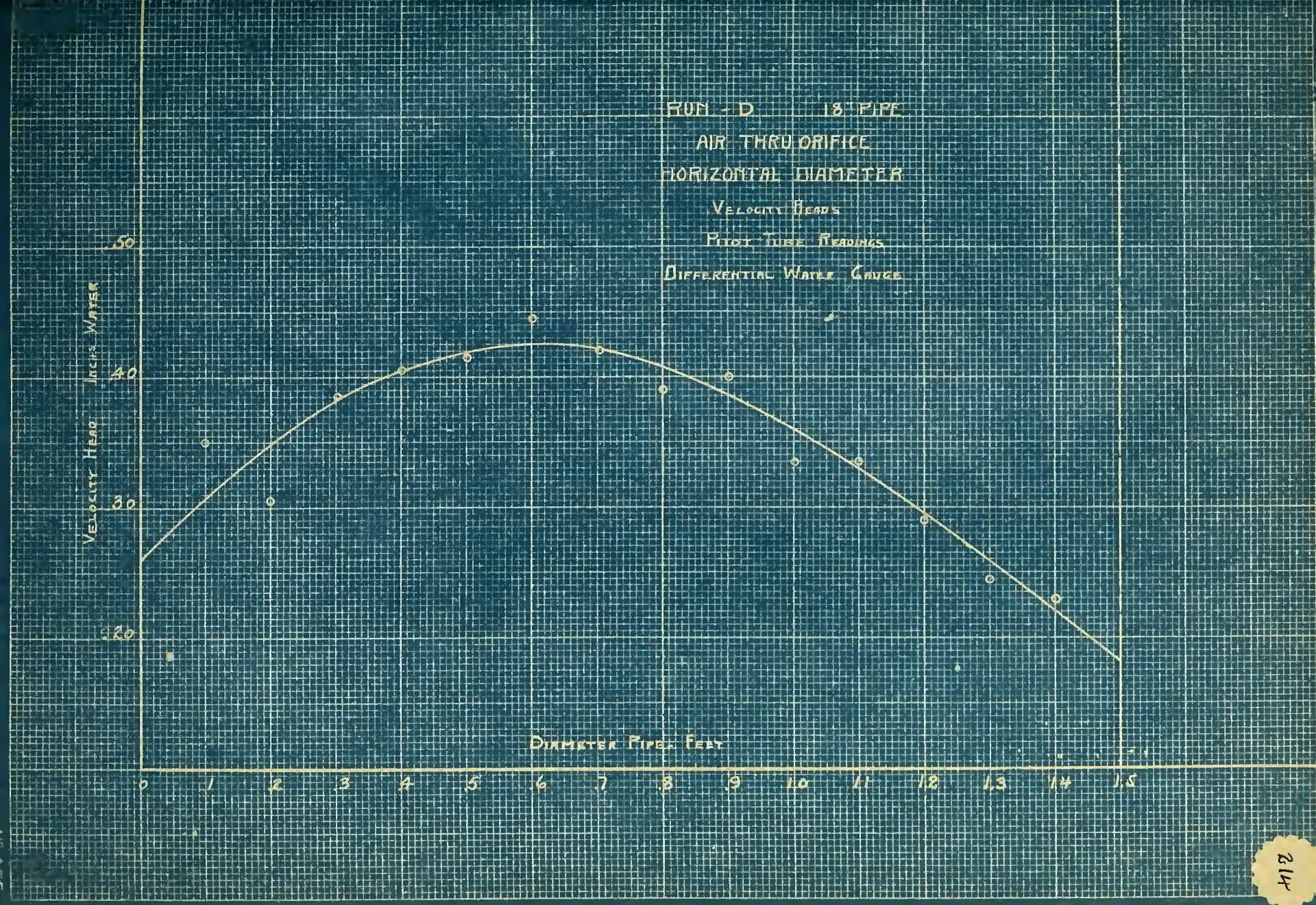
012

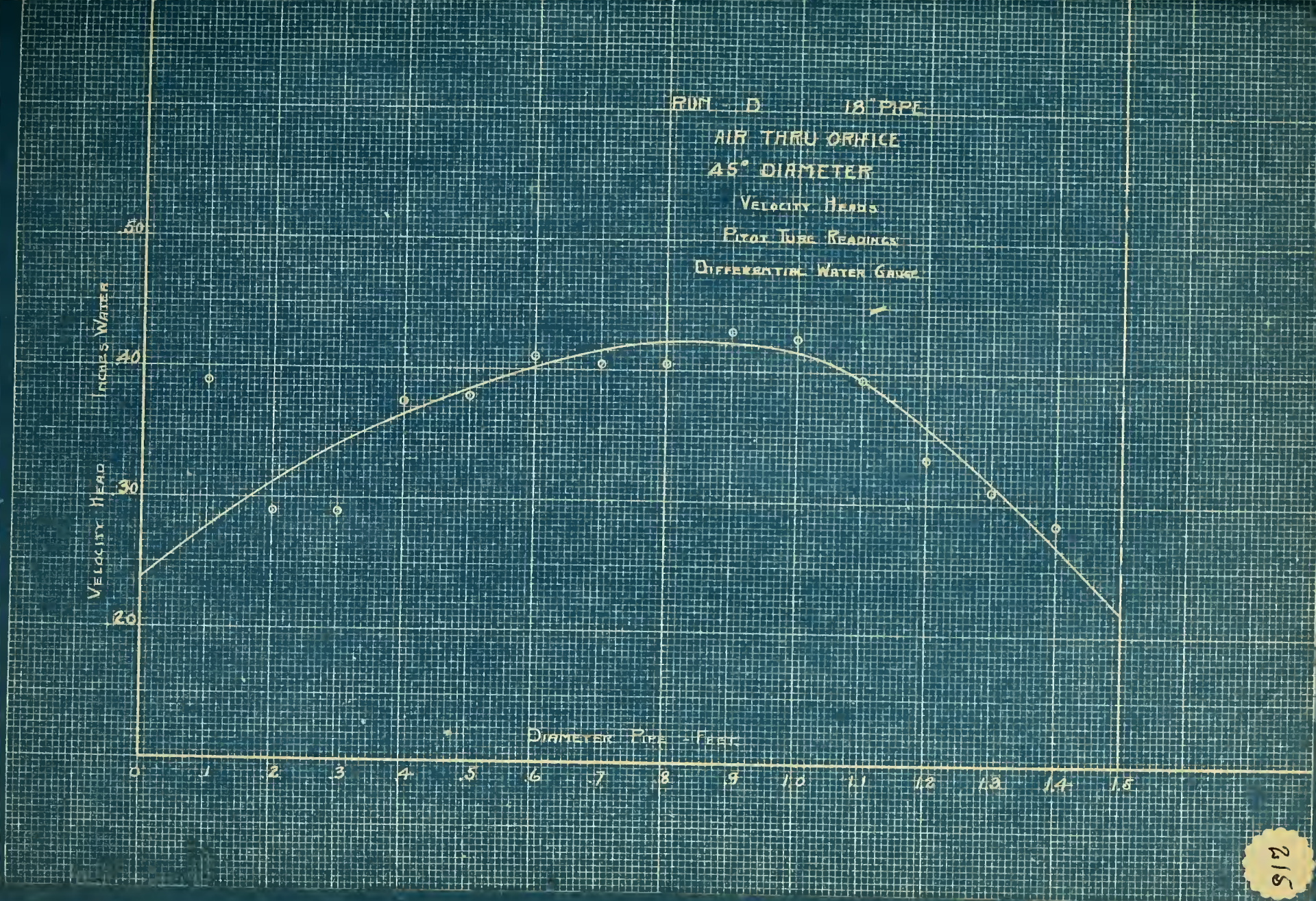

RUN - C 18" AIR PIPE
45° DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
VELOCITY HEAD
.4
.3
.2
.1
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
1.1
1.2
1.3
1.4
1.5
DIAMETER PIPE - FEET

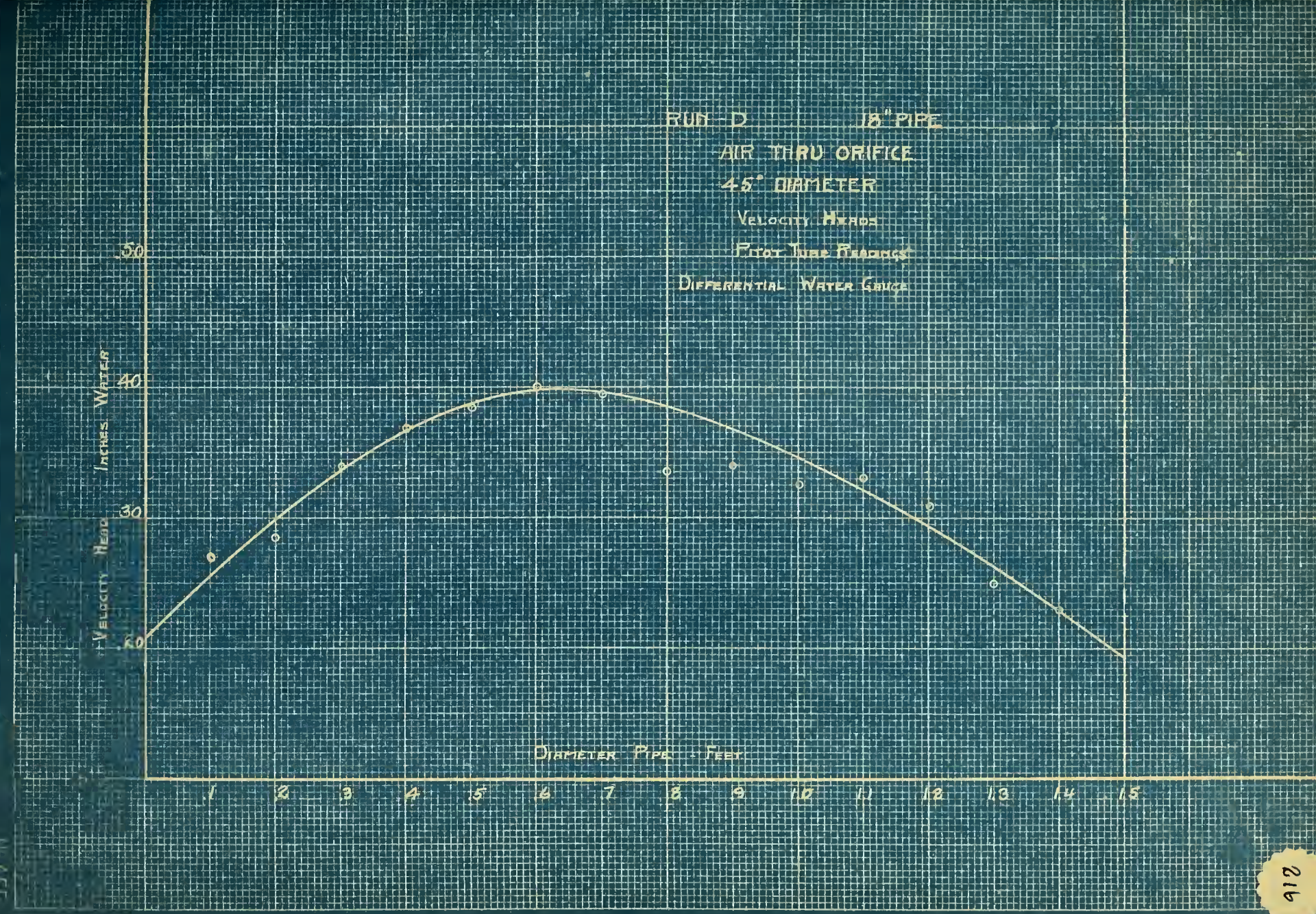

RUN - C 18" AIR PIPE
4.5" DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
VELOCITY HEAD
.4
.3
.2
.1
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
1.1
1.2
1.3
1.4
1.5
DIAMETER PIPE - FEET

212

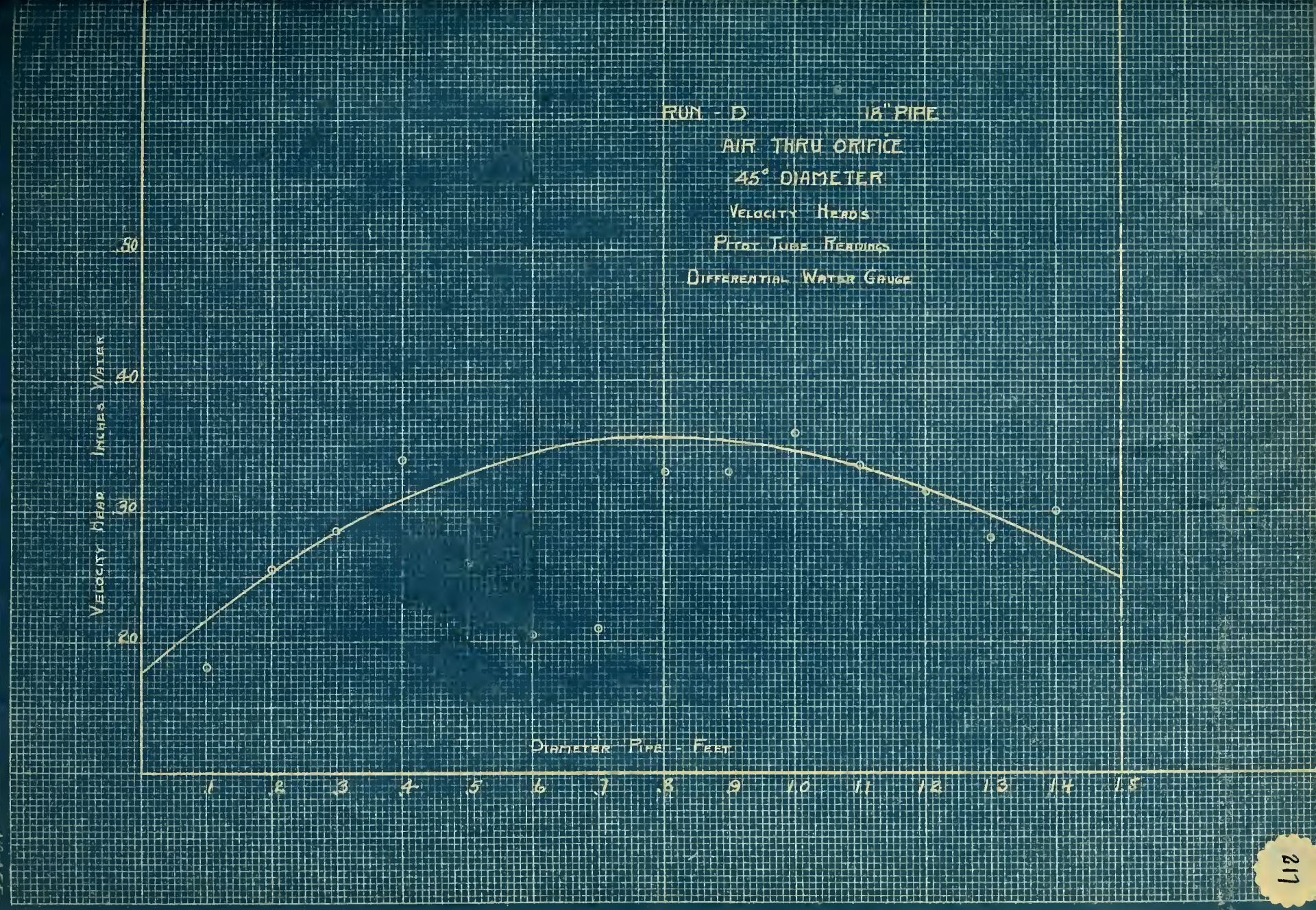

RUN - C 18" AIR PIPE
VERTICAL DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
VELOCITY HEAD
.1
.2
.3
.4
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
1.1
1.2
1.3
1.4
1.5
DIAMETER PIPE - FEET


RUN - D 18" PIPE
AIR THRU ORIFICE
HORIZONTAL DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
VELOCITY HEAD INCHS WATER
.50
.40
.30
.20
DIAMETER PIPE, FEET
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
1.1
1.2
1.3
1.4
1.5

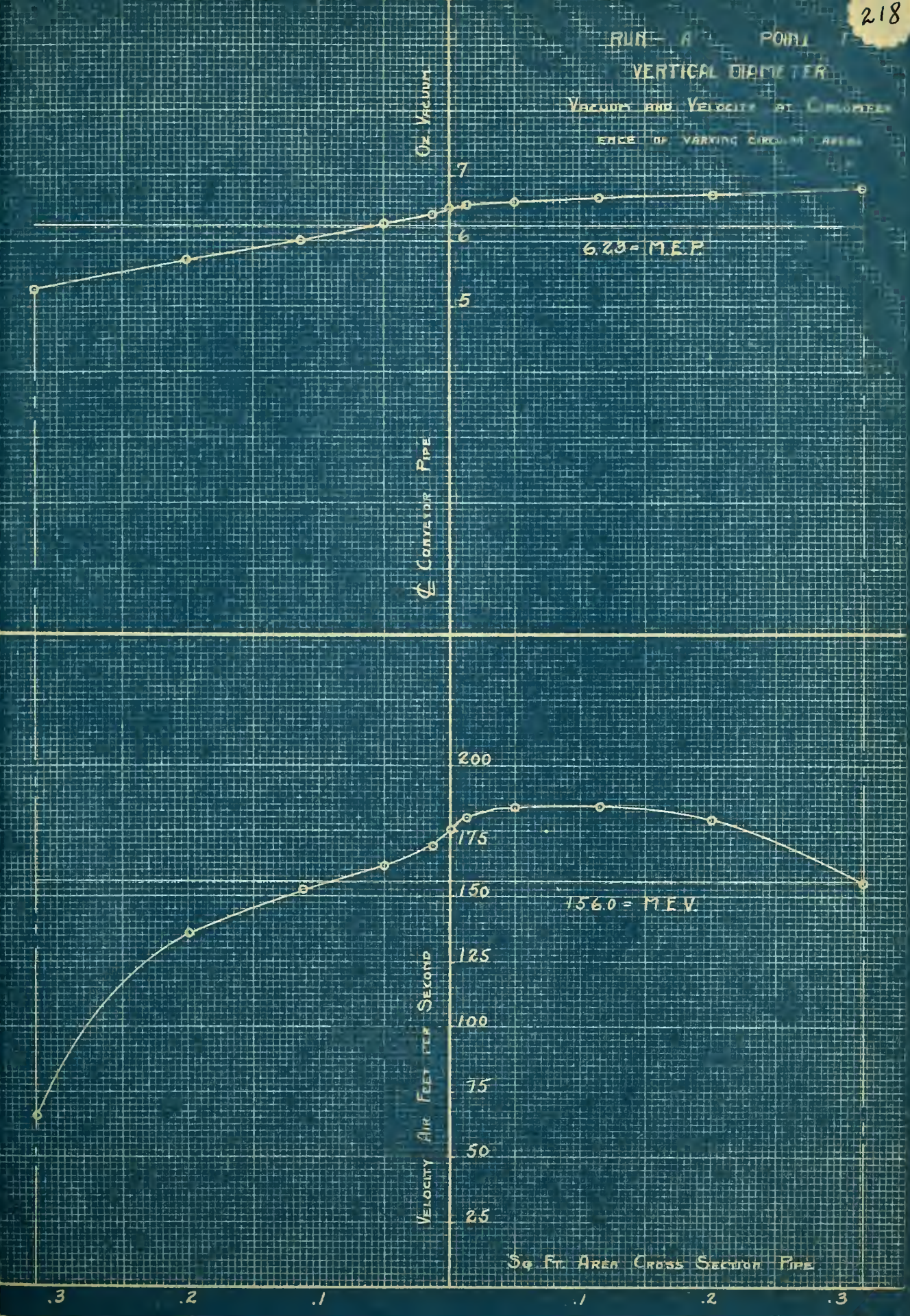

RUN D 18" PIPE
AIR THRU ORIFICE
45° DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
VELOCITY HEAD INCHES WATER
50
40
30
20
DIAMETER PIPE - FEET
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
1.1
1.2
1.3
1.4
1.5

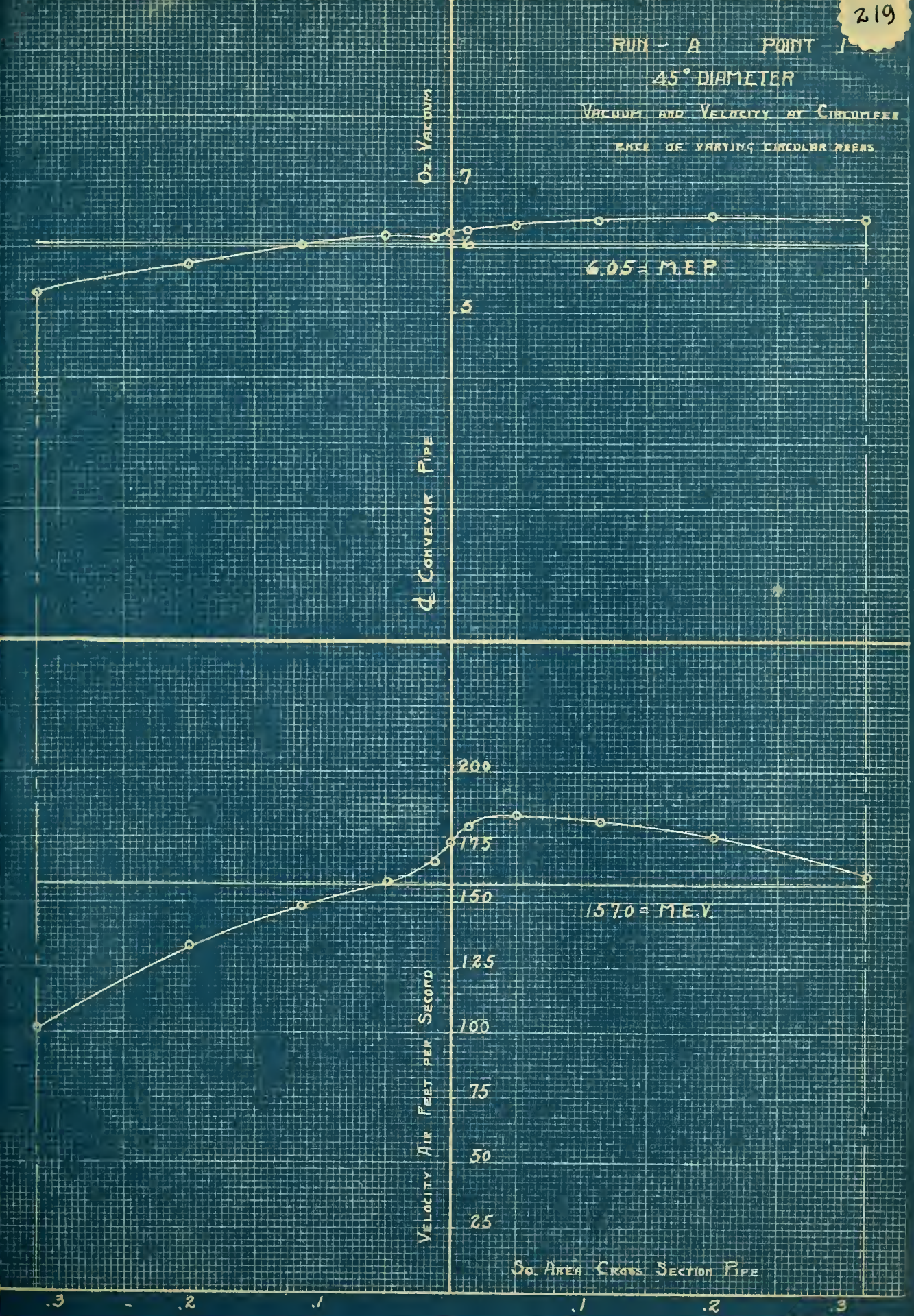

RUN - D
18" PIPE
AIR THRU ORIFICE
45" DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
VELOCITY HEAD - INCHES WATER
50
40
30
20
DIAMETER PIPE - FEET
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

912


RUN - D
18" PIPE
AIR THRU ORIFICE
.45° DIAMETER
VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL WATER GAUGE
VELOCITY HEAD INCHES WATER
.50
.40
.30
.20
DIAMETER PIPE - FEET
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
1.1
1.2
1.3
1.4
1.5

RUN- A POINT
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE
EACH OF VARYING CIRCULAR AREAS



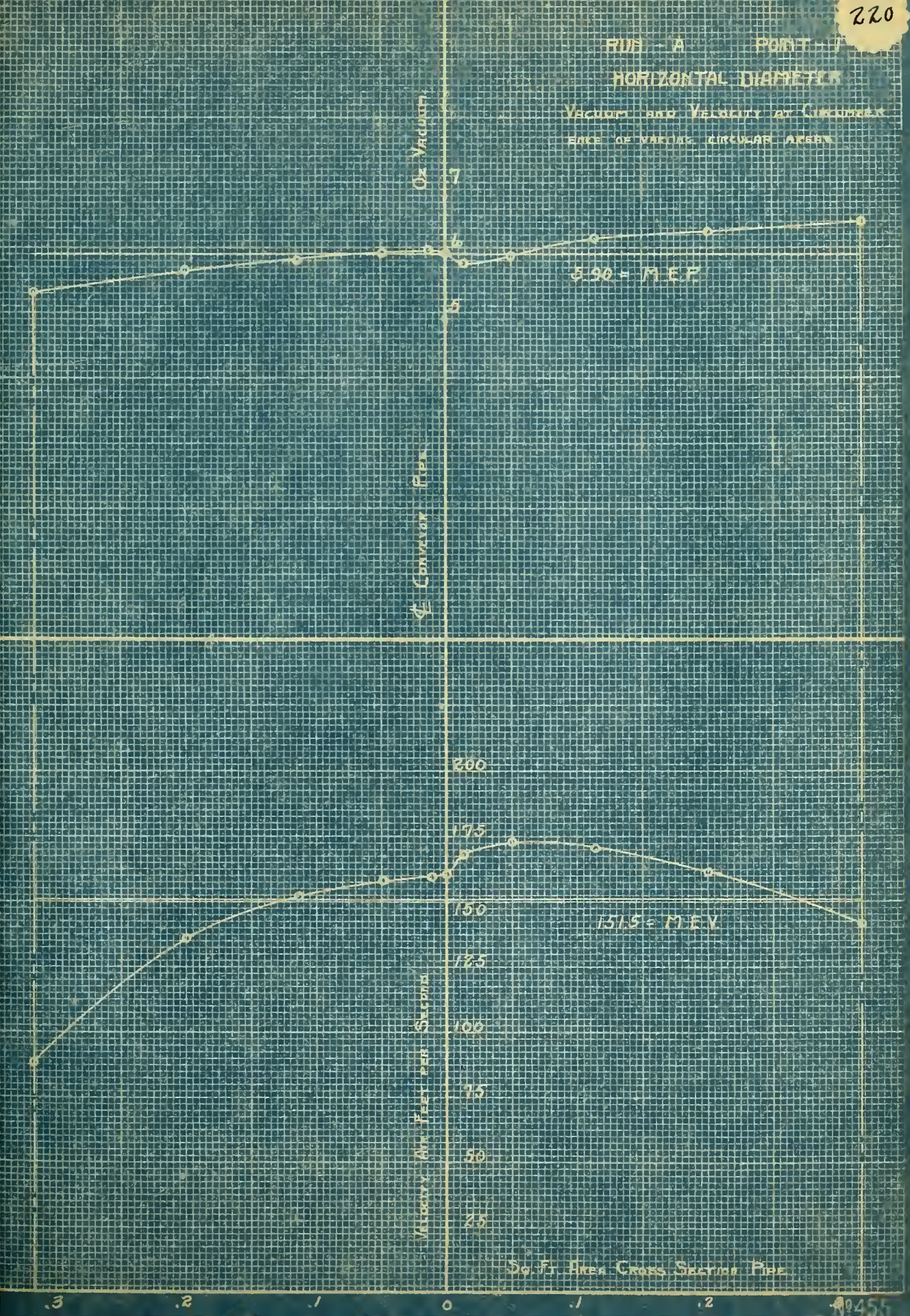

RUN - A POINT
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE
FACE OF VARYING CIRCULAR AREAS
OZ. VACUUM
7
6
5
6.05 = M.E.P
℄ CONVEYOR PIPE
200
175
150
125
100
75
50
25
157.0 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. AREA CROSS SECTION PIPE
.3
.2
.1
.1
.2
.3

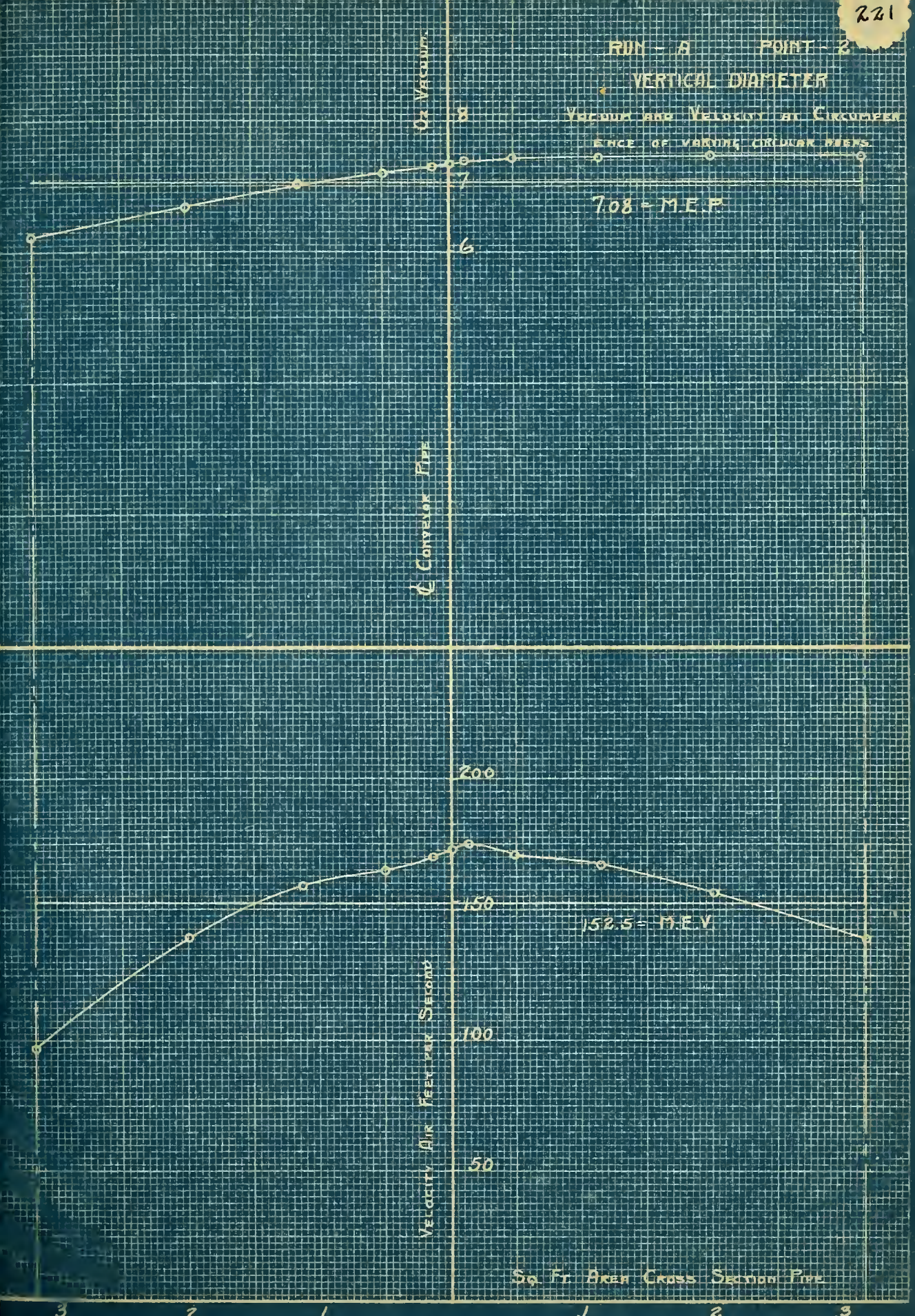
RUN - A POINT - A

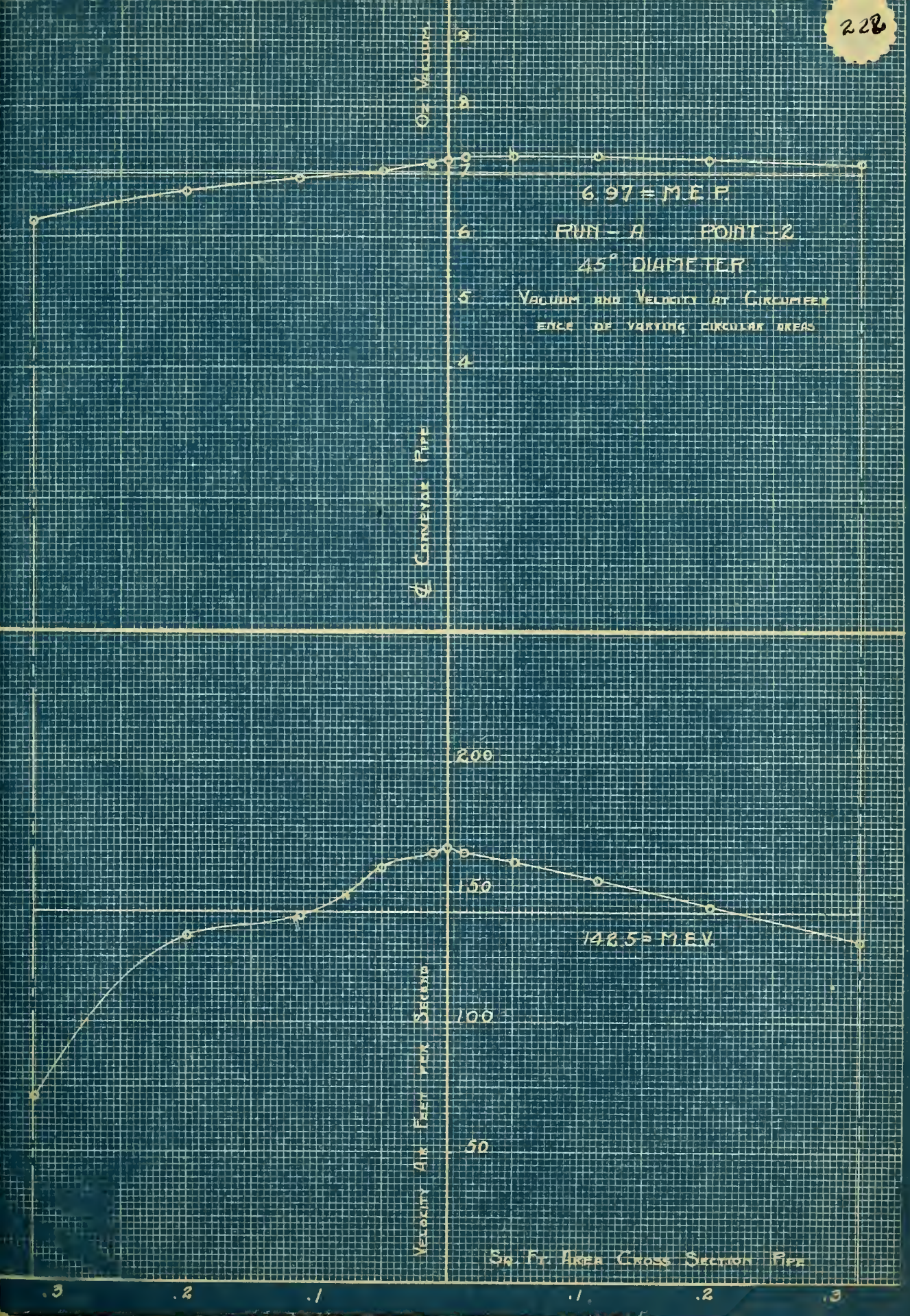
HORIZONTAL DIAMETER

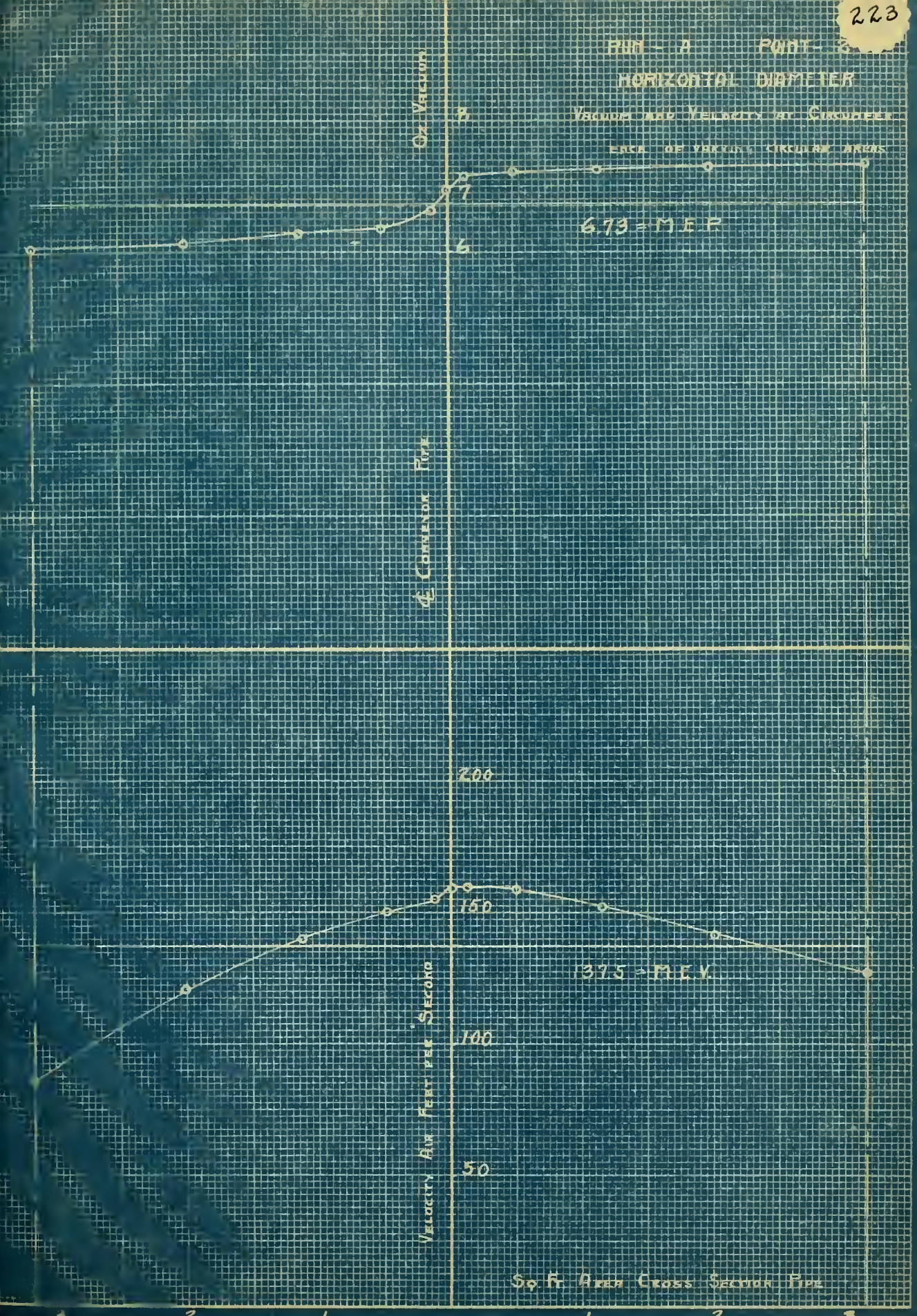
Vacuum and Velocity at Circumference

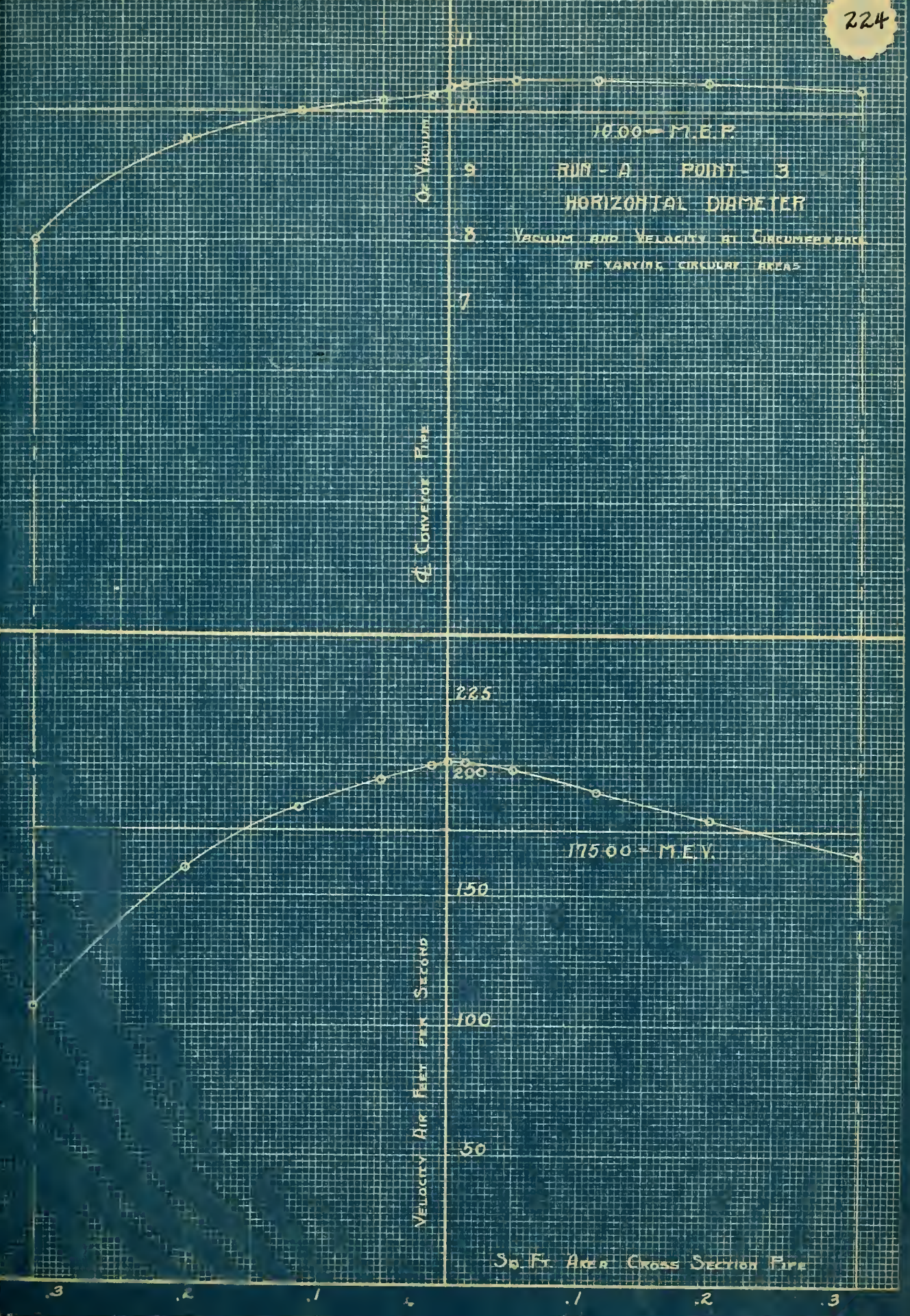
Base of varying circular areas

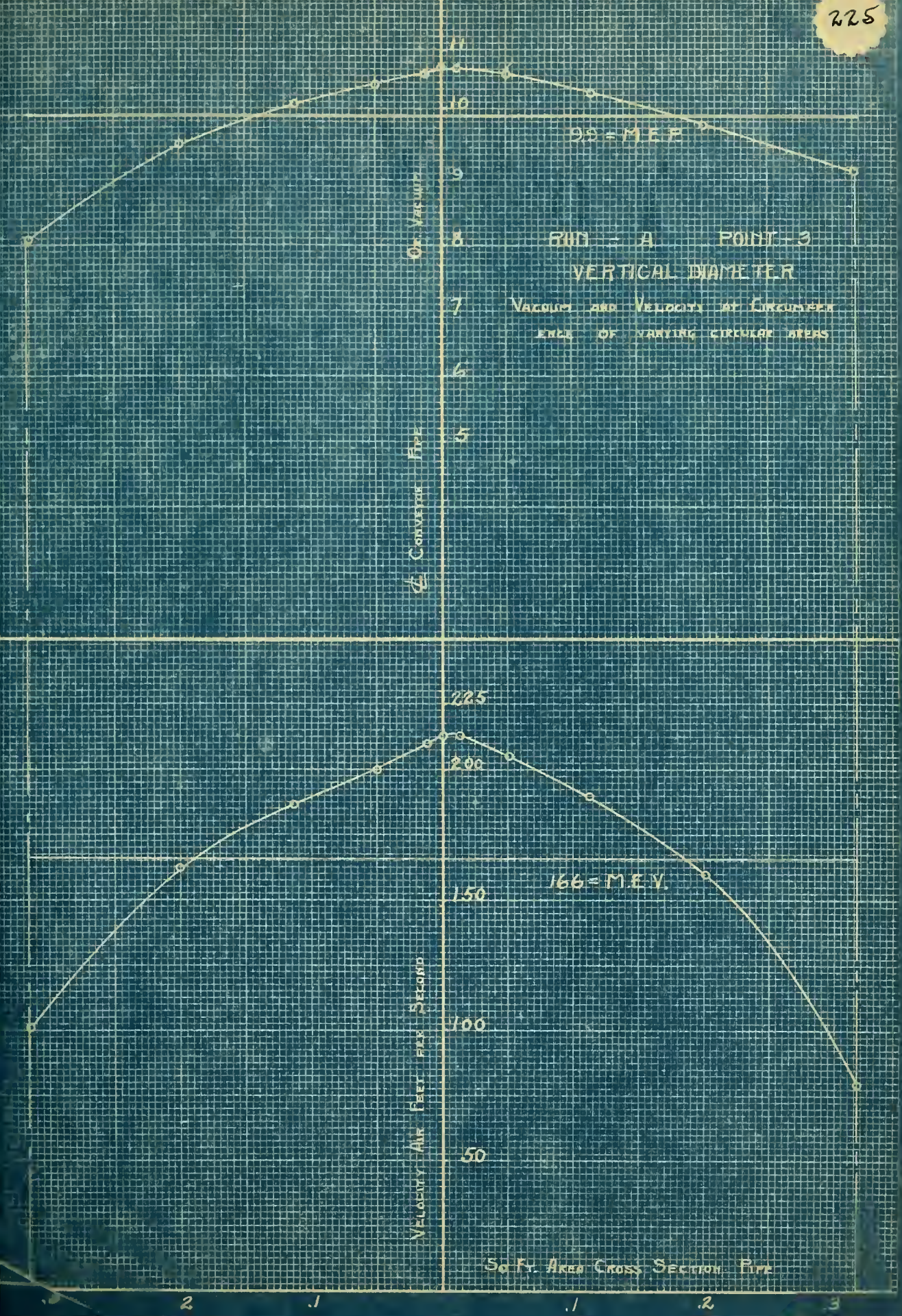


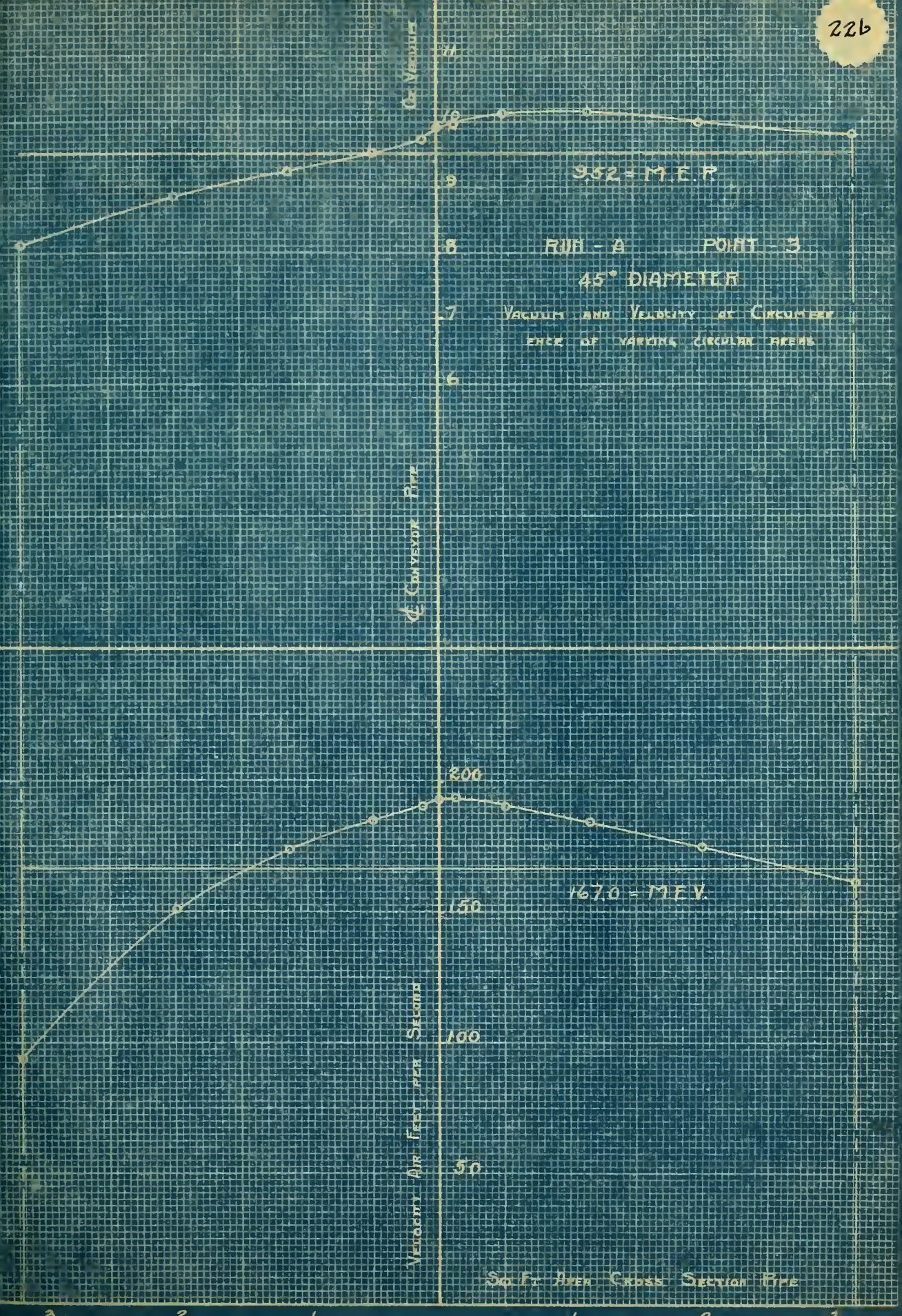

RUN - A POINT - 2
VERTICAL DIAMETER
Vacuum and Velocity at Circumference
Face of varying orifice plates
Of Vacuum
8
7
6
7.08 = M.E.P.
℄ Convector Pipe
200
150
100
50
152.5 = M.E.V
Velocity Air Feet per Second
Sq. Ft. Area Cross Section Pipe
.3
.2
.1
.1
.2
.3

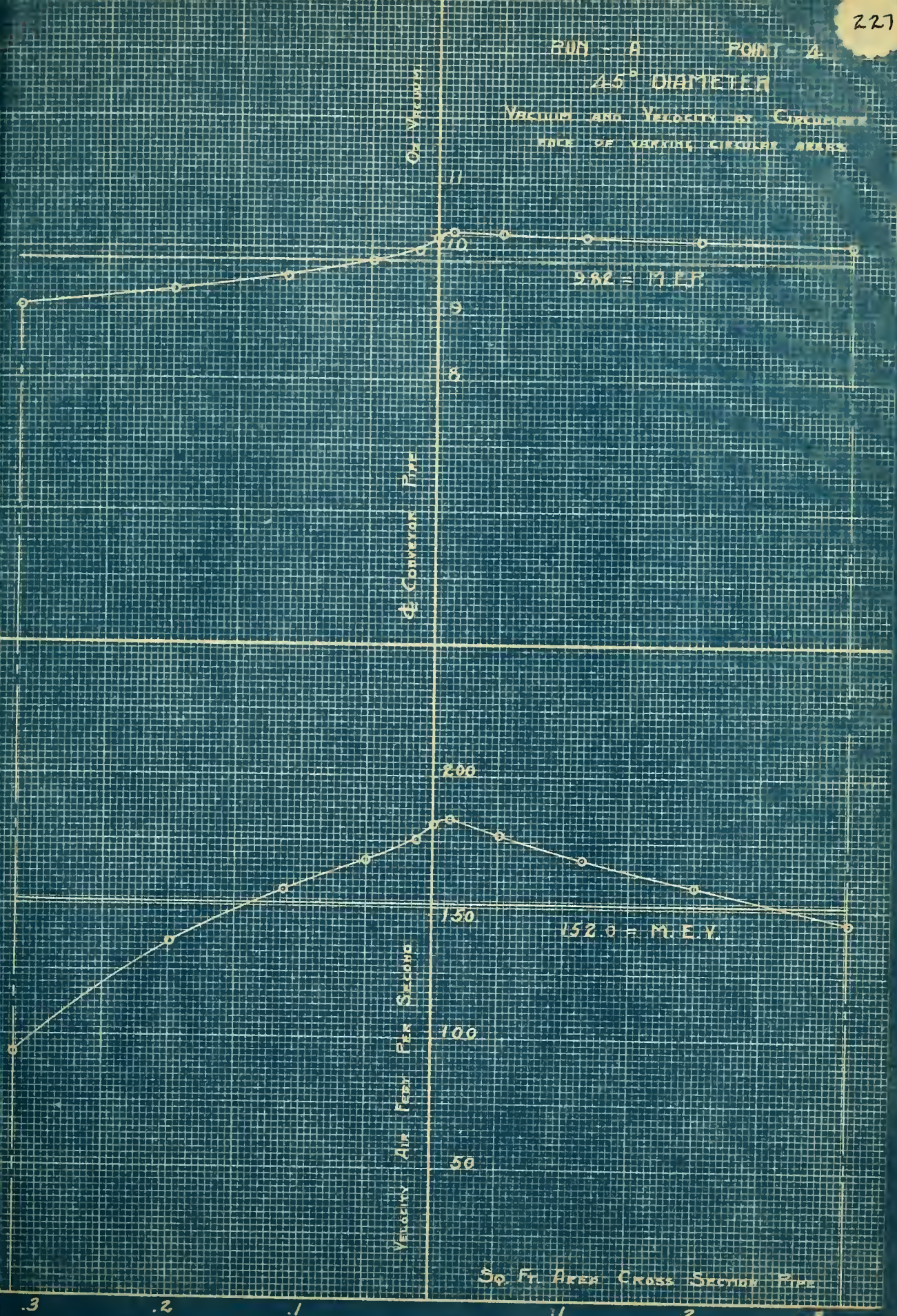

Oz Vacuum
9
8
7
6
5
4
6.97 = M.E.P.
RUN - A POINT - 2
45° DIAMETER
Vacuum and Velocity at Circumference of varying circular areas
Cl Converter Pipe
200
150
100
50
142.5 = M.E.V.
Velocity Air Feet per Second
Sq. Ft. Area Cross Section Pipe
.3
.2
.1
.1
.2
.3

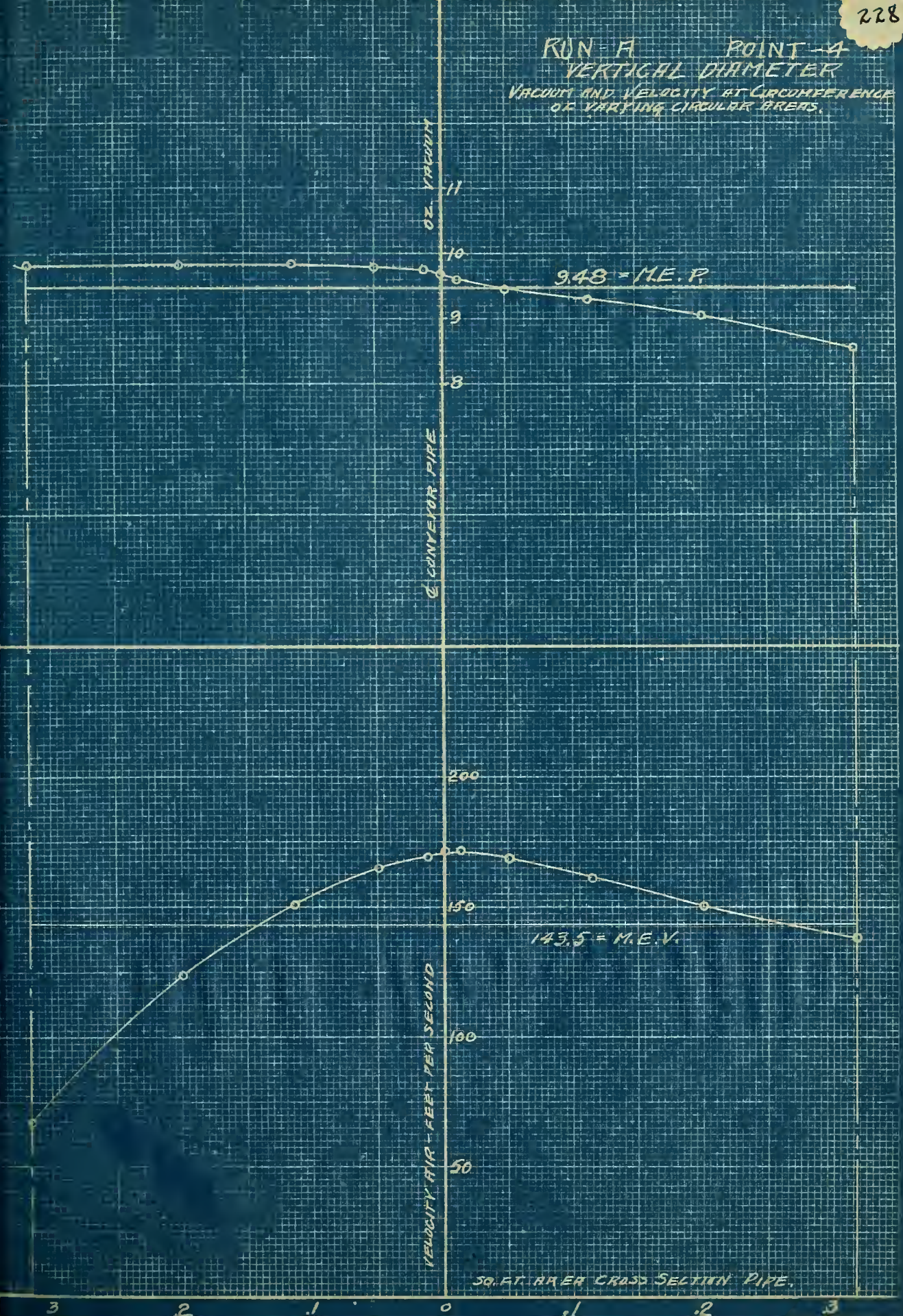

RUN A POINT 3
HORIZONTAL DIAMETER
VACUUM AND VELOCITY IN CIRCULAR
AREA OF VARIOUS CIRCULAR AREAS
Oz. VACUUM
8
7
6
6.73 = M.E.P.
Oz. COMPRESSION FOR
200
150
100
50
13.73 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
.1
.2
.3

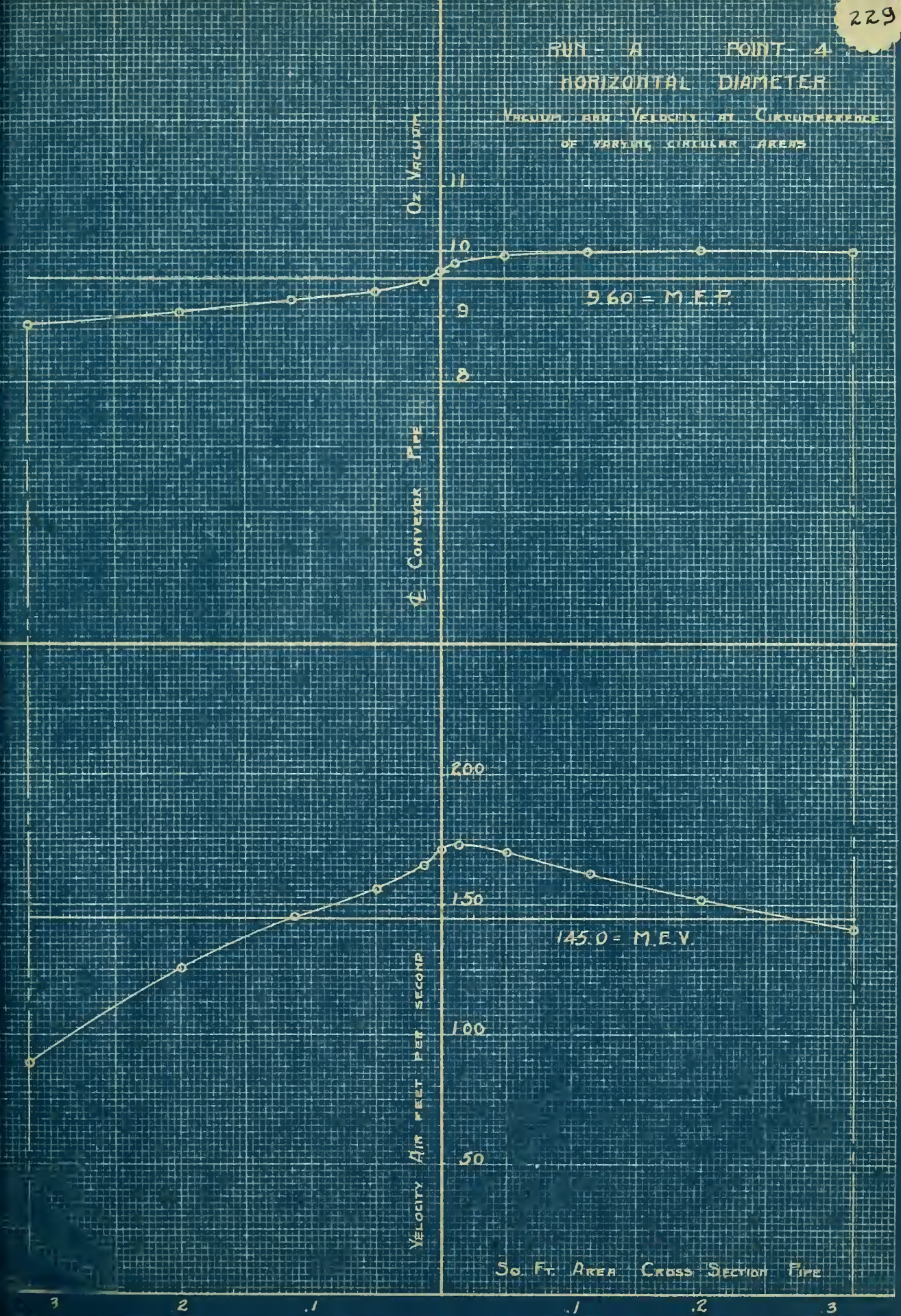

11
10
9
8
7
Q Vacuum
1000 - M.E.P.
RUN - A POINT - 3
HORIZONTAL DIAMETER
Vacuum and Velocity at Circumference
of Varying Circular Areas
Q Convector Pipe
225
200
175.00 - M.E.V.
150
100
50
Velocity Air Feet per Second
Sq. Ft. Area Cross Section Pipe
.3
.2
.1
.1
.2
.3

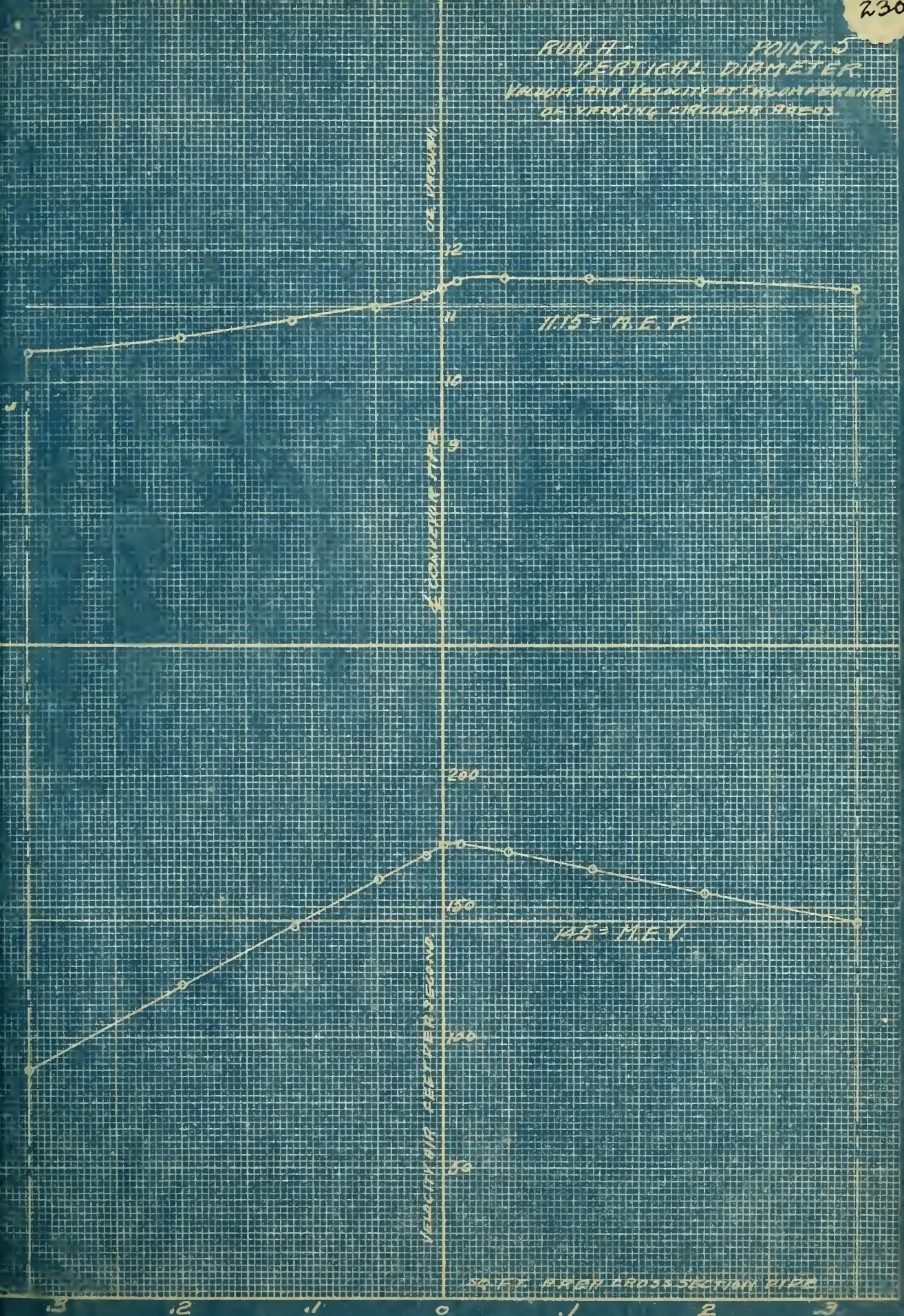

11
10
9
8
7
6
5
99 = M.E.P.
Qu. Vacuum
RUN = A POINT = 3
VERTICAL DIAMETER
Vacuum and Velocity at Circumference
Each of Varying Circular Areas
Qu. Converted Pipe
225
200
150
100
50
166 = M.E.V.
Velocity Air Feet per Second
Sq. Ft. Area Cross Section Pipe
.2
.1
.1
.2
.3

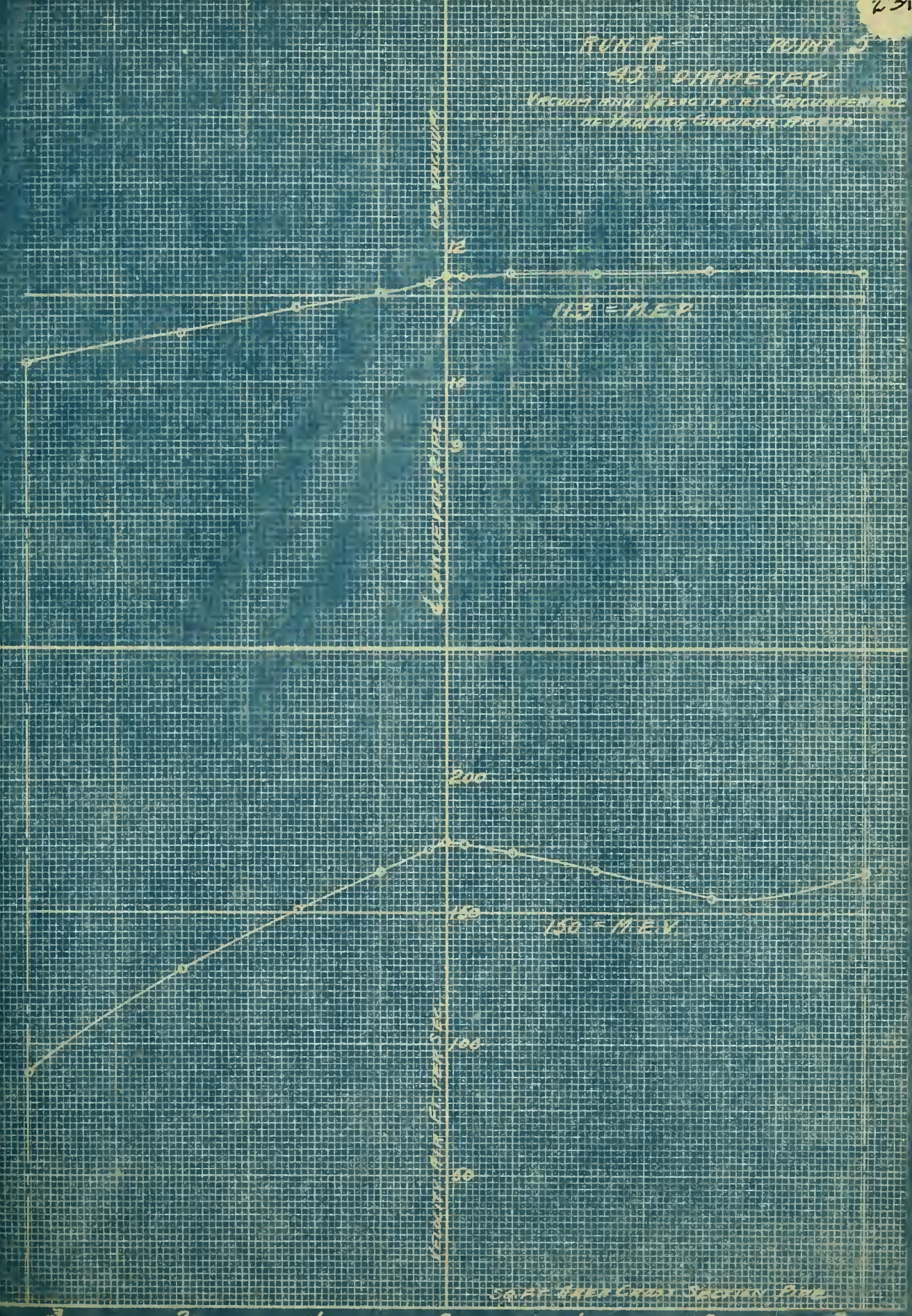

Vacuum
10
9
8
7
6
9.52 = M.E.P.
RUN - A
POINT - 3
45" DIAMETER
Vacuum and Velocity at Circumference of varying circular areas
Cylinder Bore
200
150
100
50
167.0 = M.E.V.
Velocity Air Feet per Second
Sq. Ft. Area Cross Section Bore
.3
.2
.1
.1
.2
.3

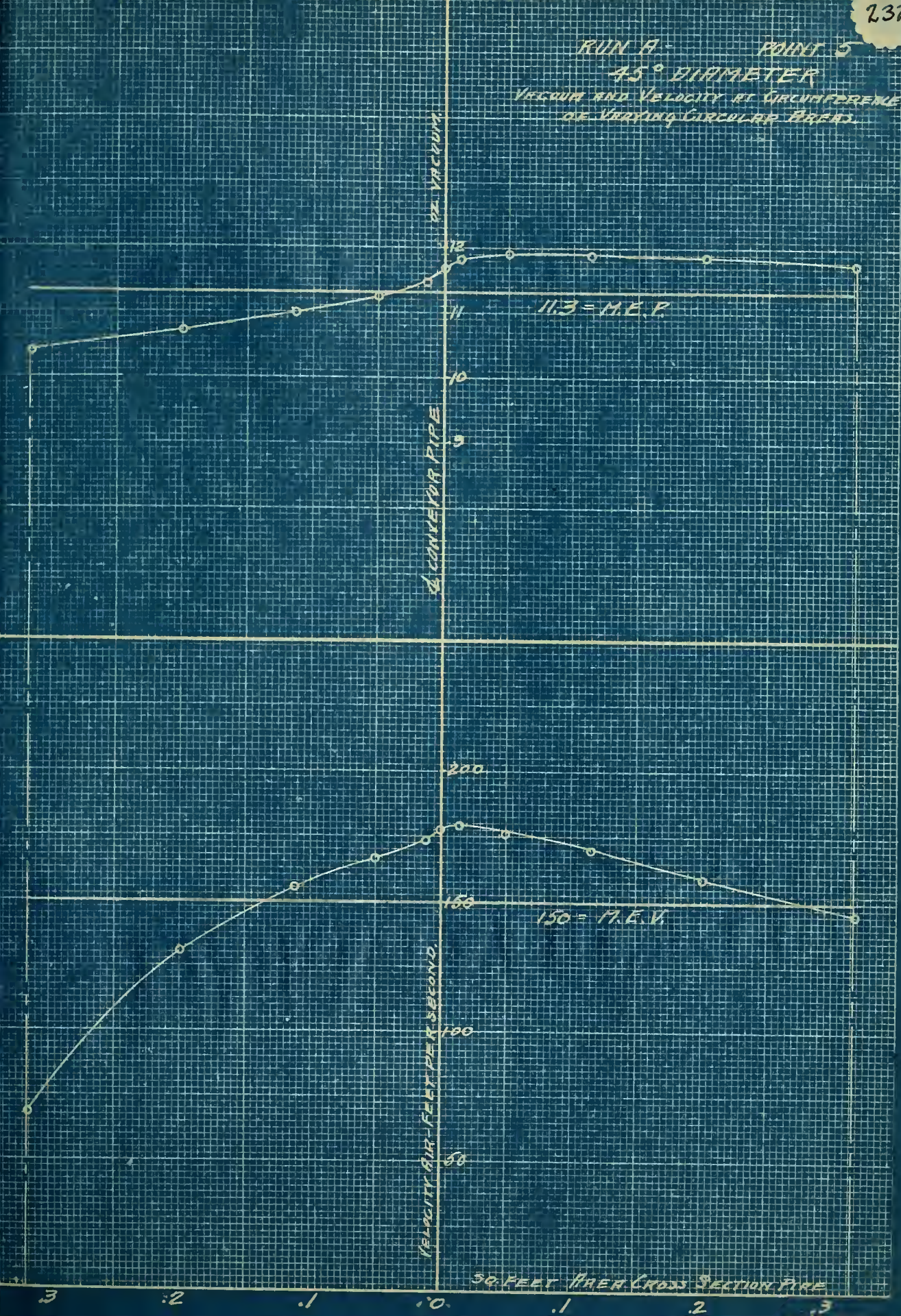

RUN - A POINT - 4
45° DIAMETER
Vacuum and Velocity at Circumference of various circular areas
Q Vacuum
11
10
9.82 = M.E.P.
9
8
Q Conveyor Pipe
200
150
152.0 = M.E.V.
100
50
Velocity Air Feet Per Second
Sq. Ft. Area Cross Section Pipe
.3
.2
.1
.1
.2
.3

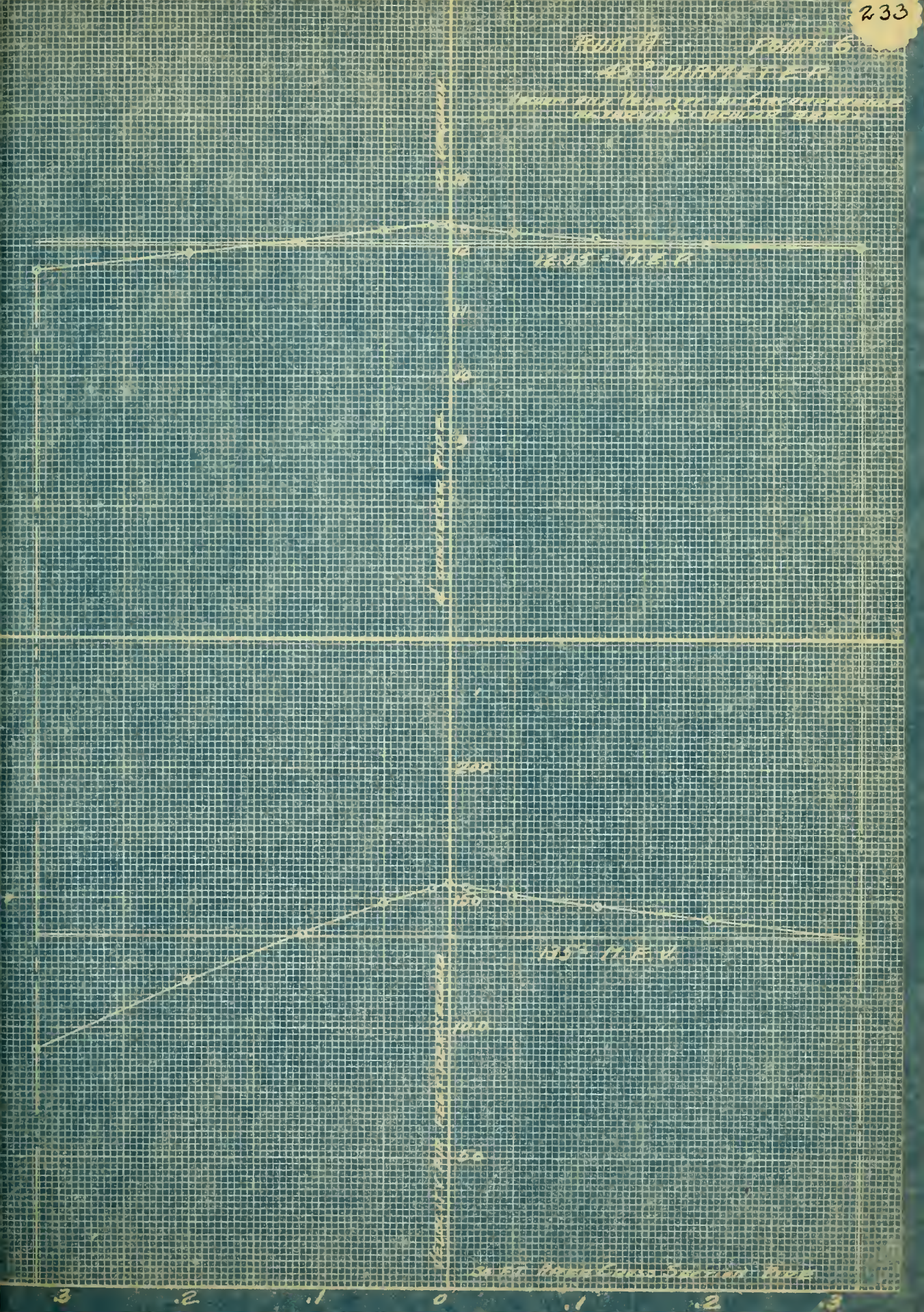

RUN - A POINT - 4
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS.
OZ. VACUUM
11
10
9
8
9.48 = M.E.P.
@ CONVEYOR PIPE
200
150
100
50
143.5 = M.E.V.
VELOCITY AIR - FEET PER SECOND
50 FT. AREA CROSS SECTION PIPE.
3
2
.1
0
.1
.2
.3

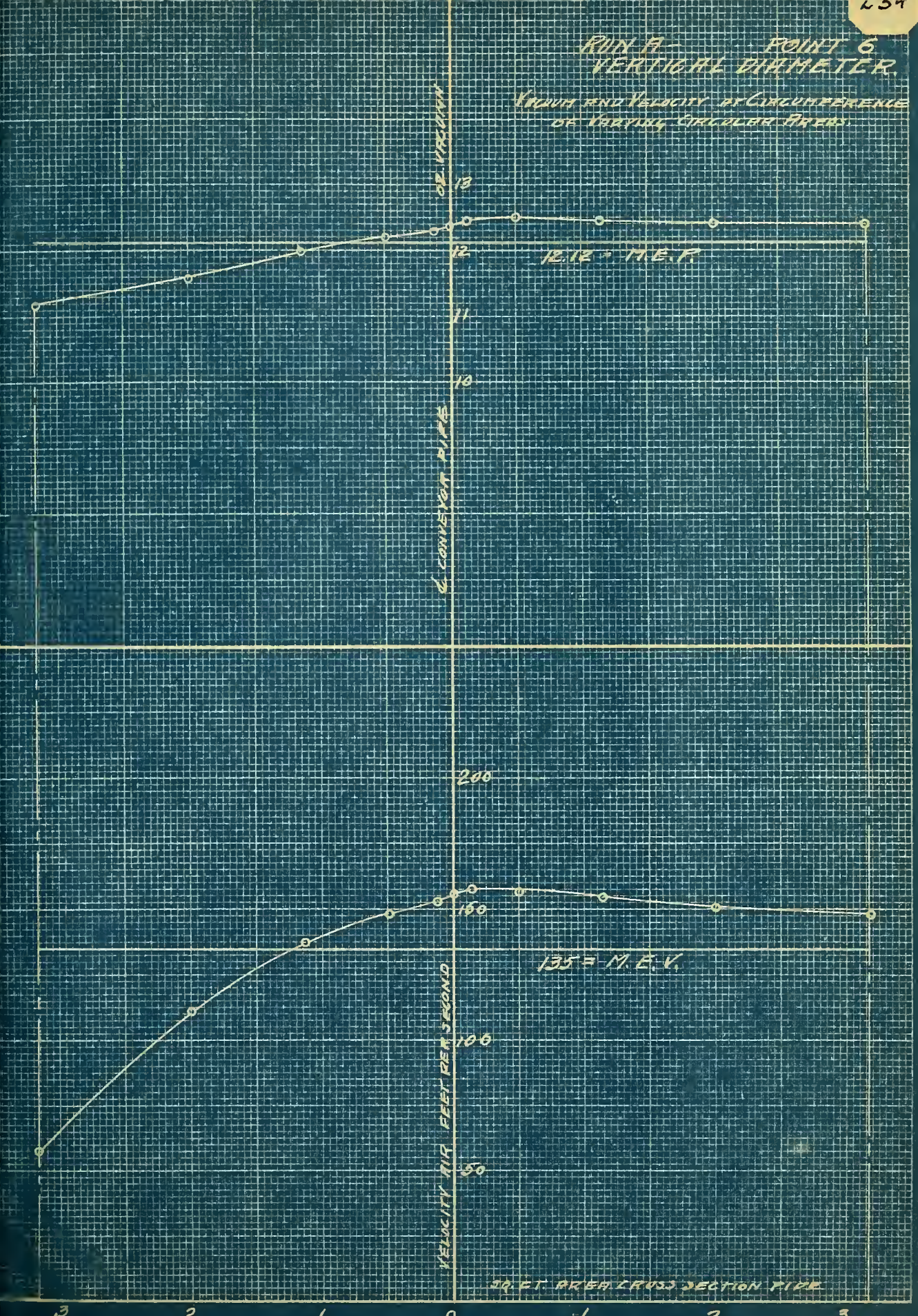

RUN - A POINT - 4
HORIZONTAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE
OF VARYING CIRCULAR AREAS
OZ. VACUUM
11
10
9
8
9.60 = M.E.P.
℄ CONVEYOR PIPE
200
150
100
50
145.0 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
3
2
.1
.1
.2
.3

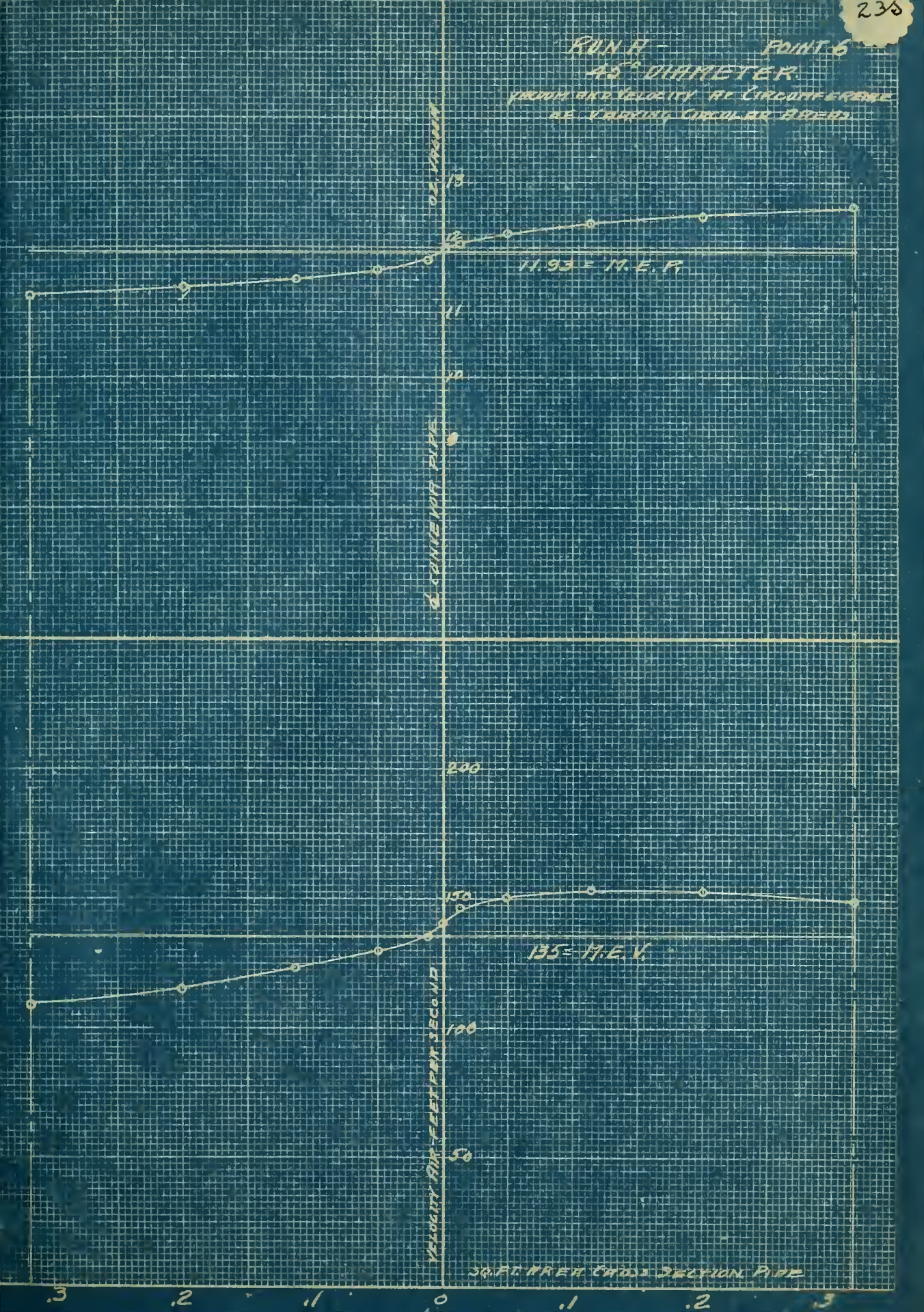

RUN 12
POINT 3
VERTICAL DIAMETER
VELOCITY AND DENSITY AT CIRCUMFERENCE
OF VARYING CIRCULAR AREAS
12
11
10
9
11.15 = M.E.P.
200
150
100
50
125 = M.E.V.
.3
.2
.1
0
.1
.2
.3


Run 11 = Point 3
40 ft. Diameter
Vacuum and Temperature Calibration
in Indiana Chamber 20 ft.
12
11
10
9
Vacuum in millimeters
11.5 = M.E.V.
200
150
100
50
Temperature in degrees Centigrade
150 = M.E.V.
.3
.2
.1
0
.1
.2
.3

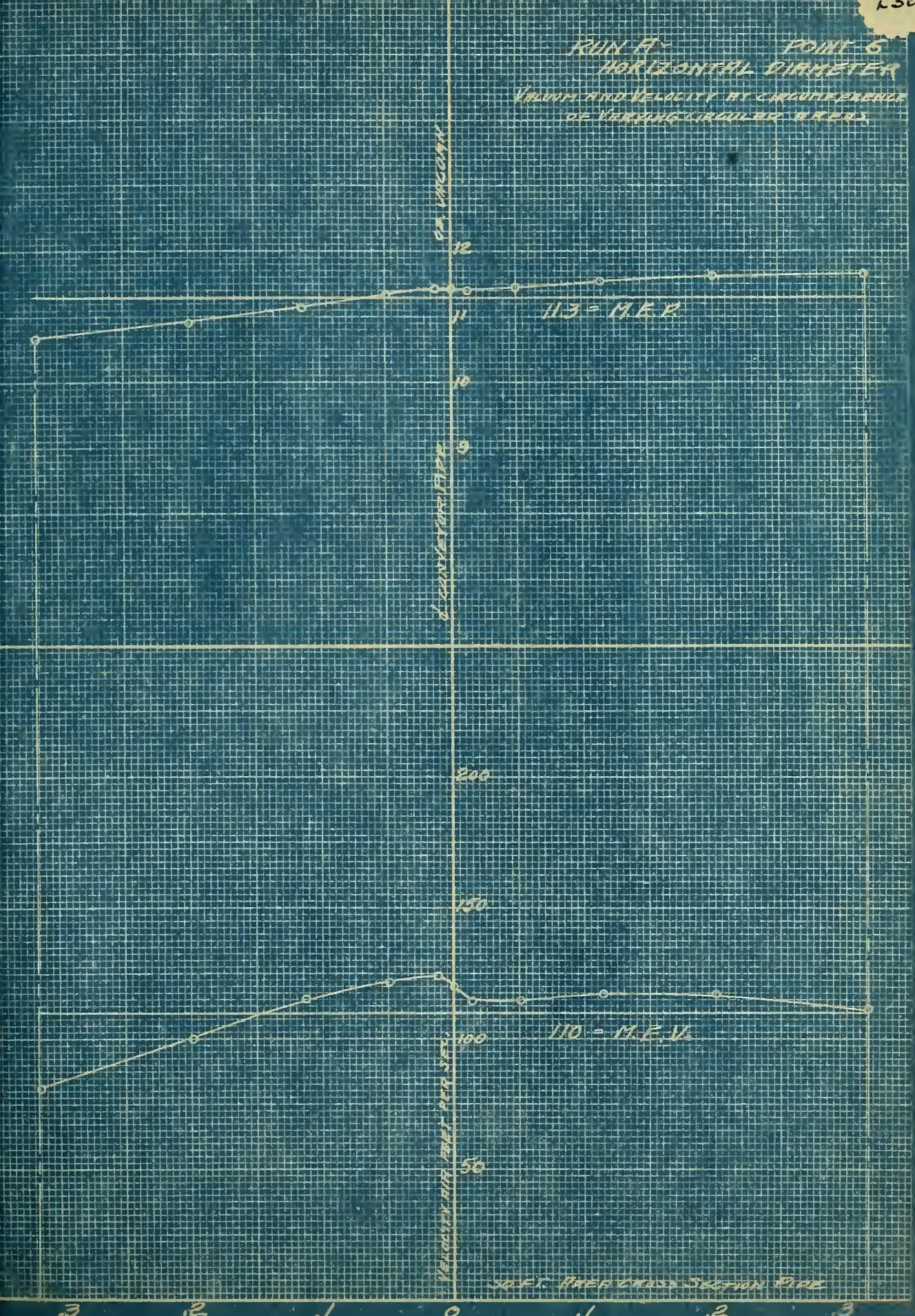

RUN A - POINT 5
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE
OF VARYING CIRCULAR AREAS.
OZ. VACUUM.
12
11
11.3 = M.E.P.
10
9
ALONG EVA PIPE
200
150
150 = M.E.V.
100
50
VELOCITY AIR - FEET PER SECOND.
SQ. FEET AREA CROSS SECTION PIPE
.3
.2
.1
.0
.1
.2
.3

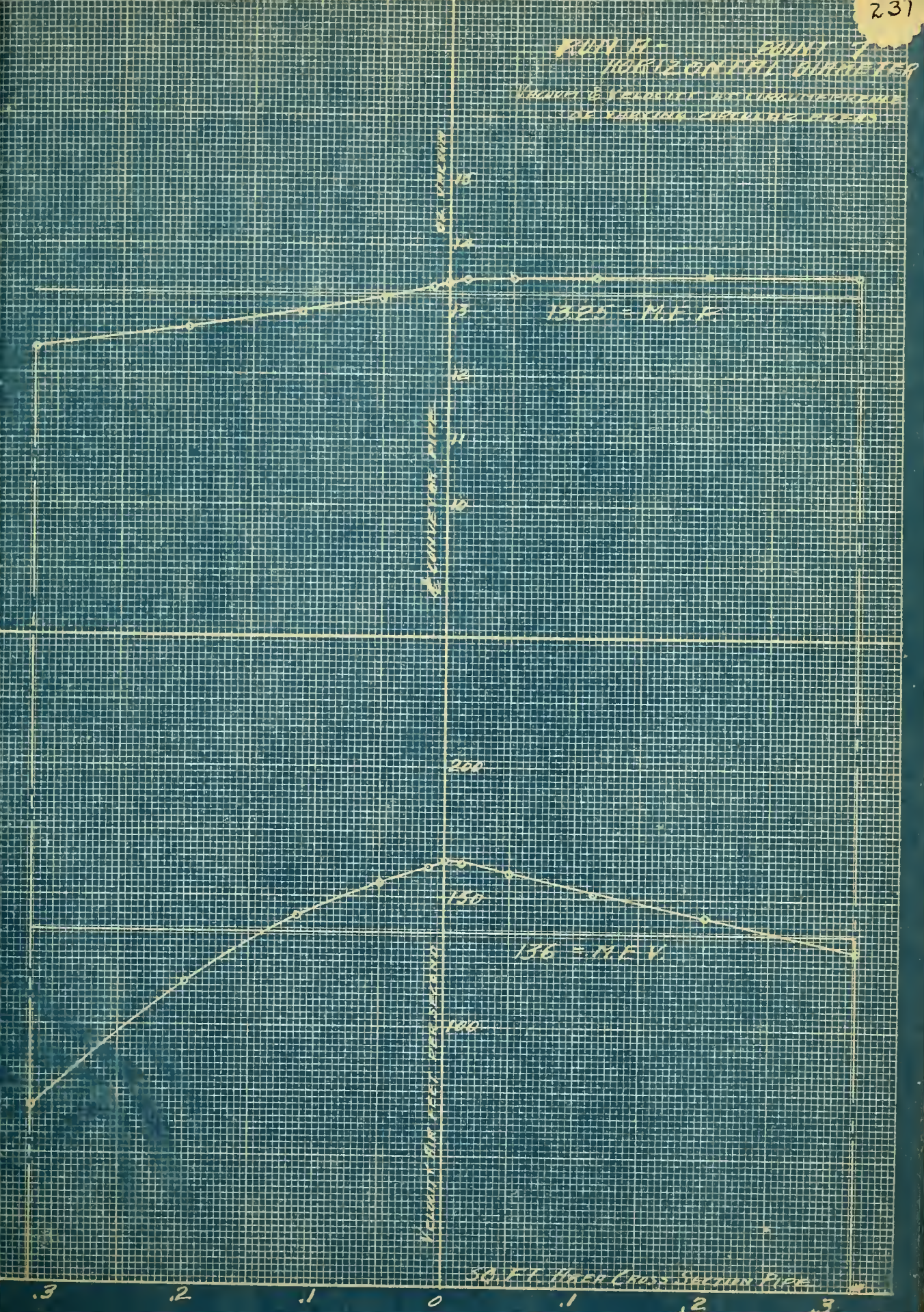

.3
.2
.1
0
.1
.2
.3

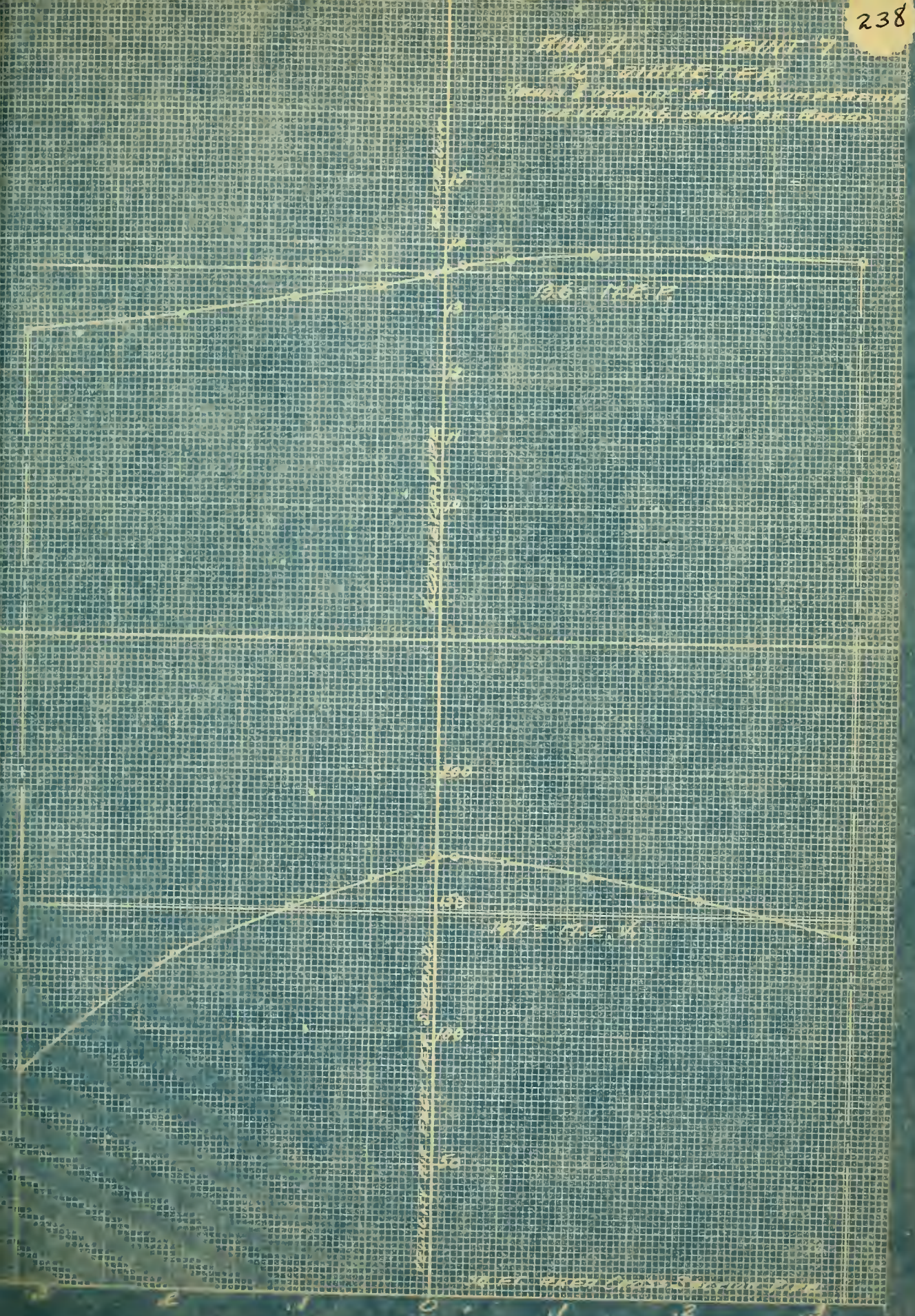

RUN A— POINT 6
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE
OF VARYING CIRCULAR PIPES
VACUUM IN INCHES OF MERCURY
13
12
11
10
12.12 = M.E.P.
d CONVERGENT PIPE
200
150
100
50
135 = M.E.V.
VELOCITY IN FEET PER SECOND
10 FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3


RUN 17 - POINT 6
49" DIAMETER
PRESSURE VELOCITY AT CIRCUMFERENCE
AS VARYING CIRCULAR SPEED
13
12
11.93 = M.E.P.
11
10
9
200
150
135 = M.E.V.
100
50
.3
.2
.1
0
.1
.2
.3

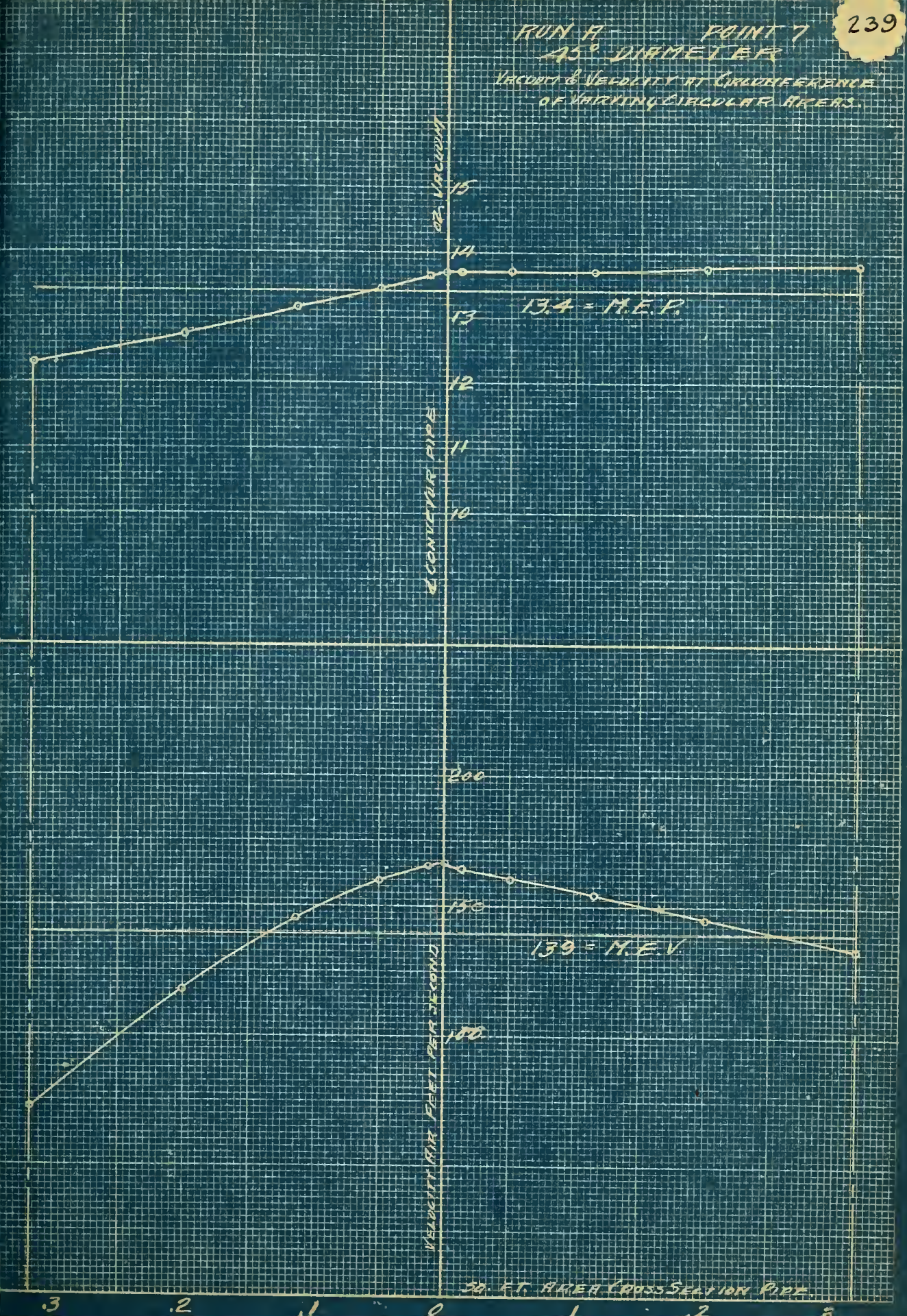
RUN A- POINT 6
HORIZONTAL DIAMETER
VARIATIONS IN VELOCITY AT CIRCUMFERENCE
OF VARIOUS CIRCULAR AREAS

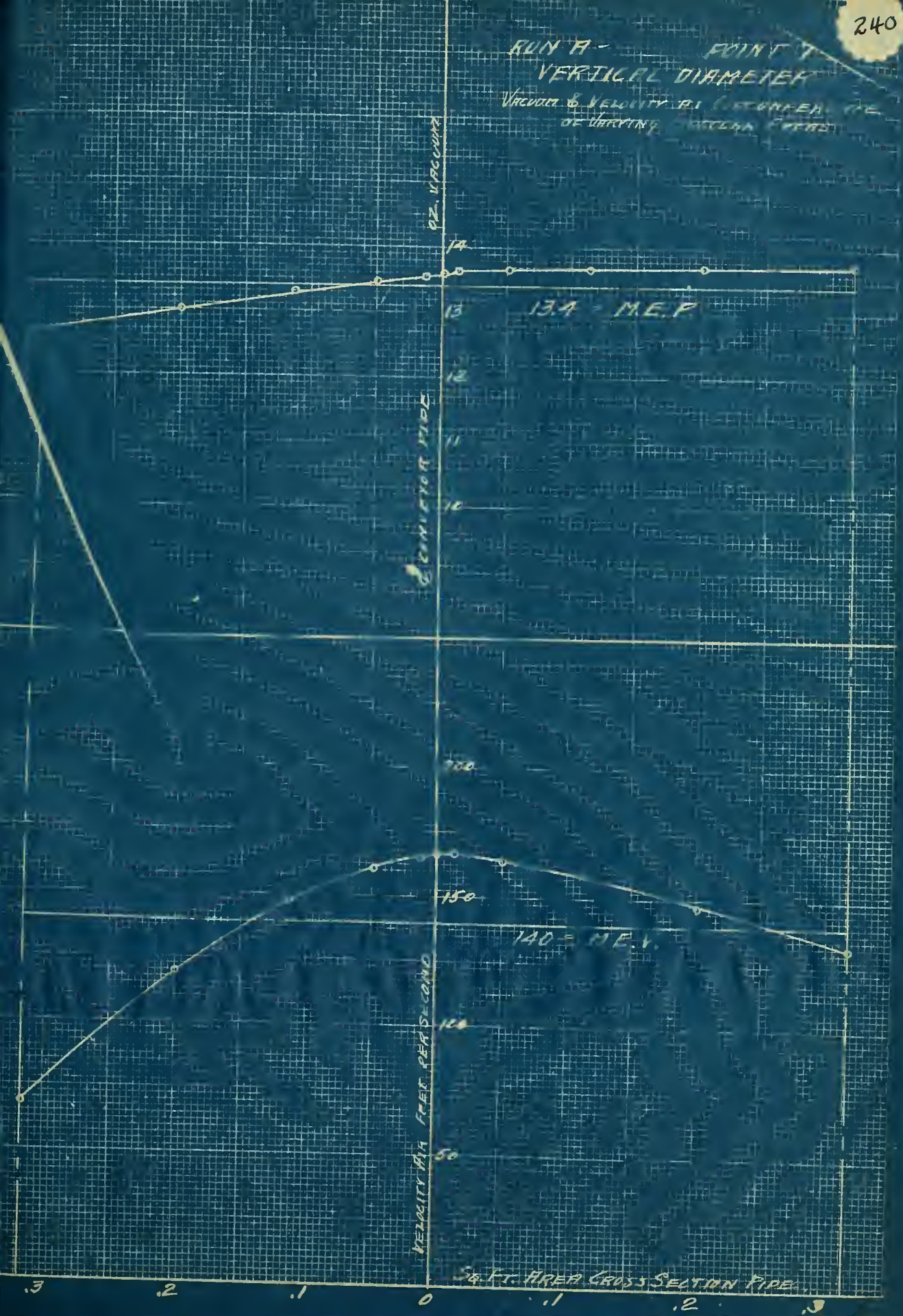


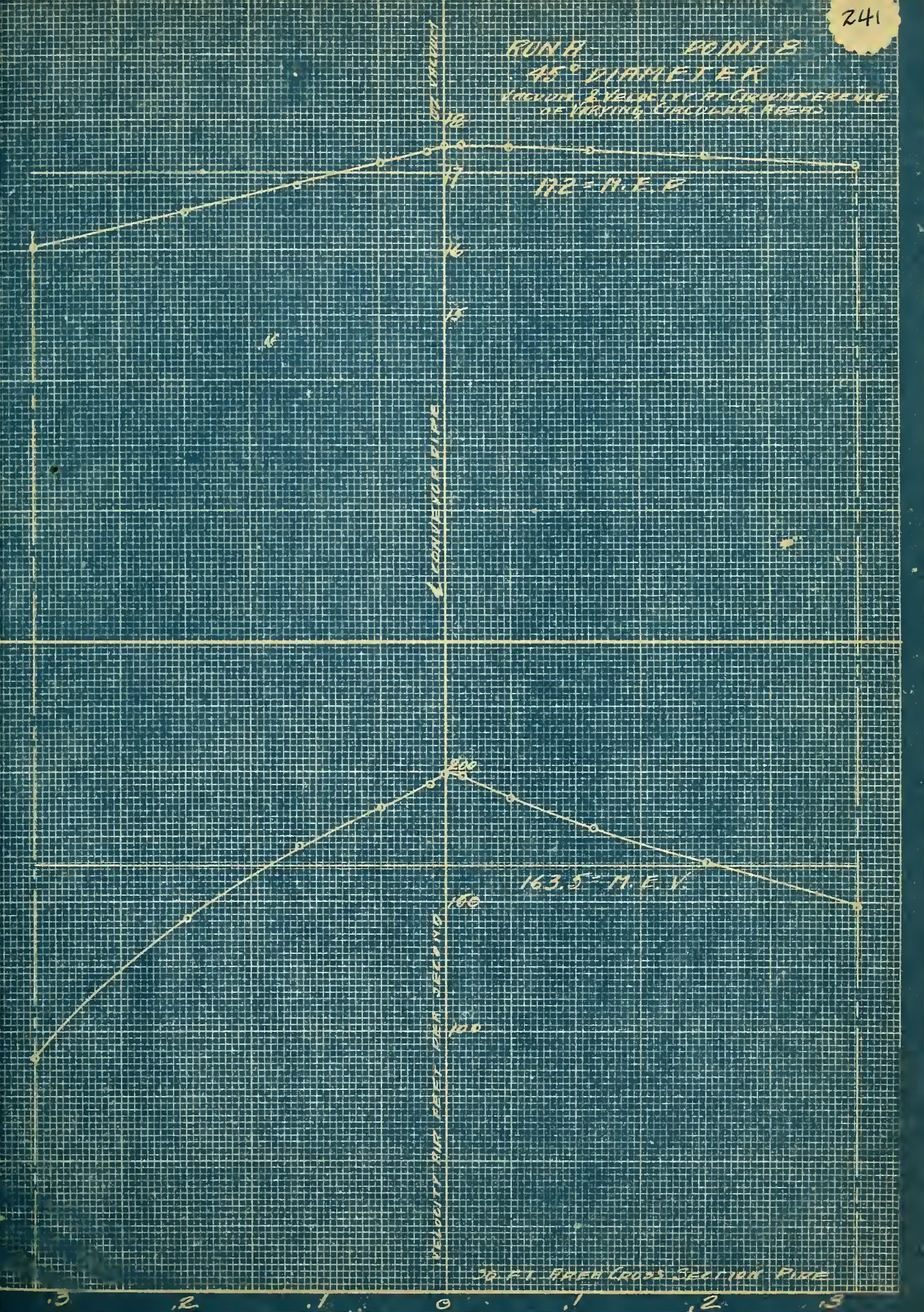

Run 6 — Point 7
Horizontal Diameter
Vacuum 28 Inches of Mercury
at Vacuum Gauge Reading
Equivalent Head in Feet
13
12
11
10
1325 = M.E.R.
200
180
160
Velocity Head in Feet per Second
136 = M.E.V.
50 Ft. Heat Cross Section Pipe
.3
.2
.1
0
.1
.2
.3

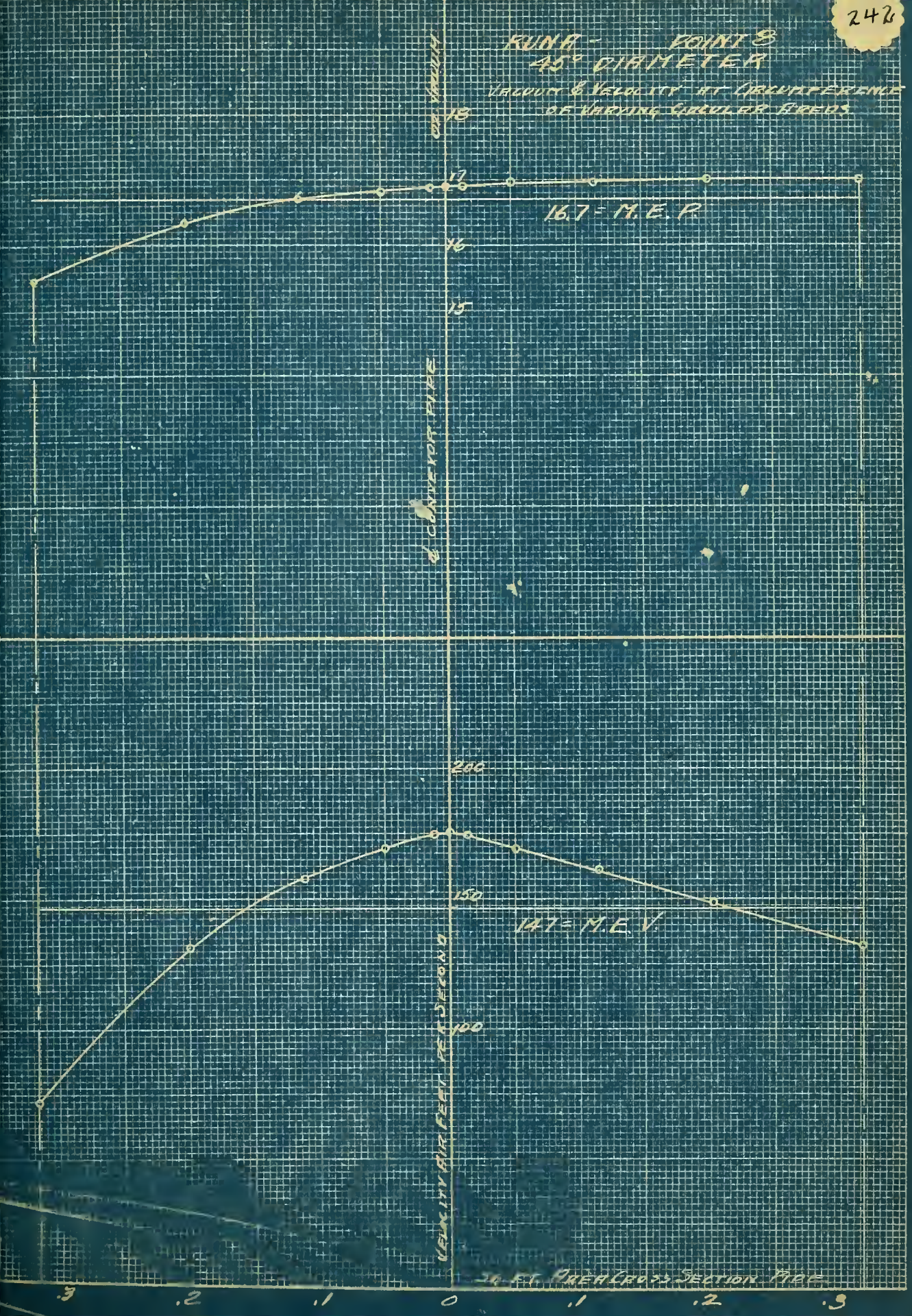


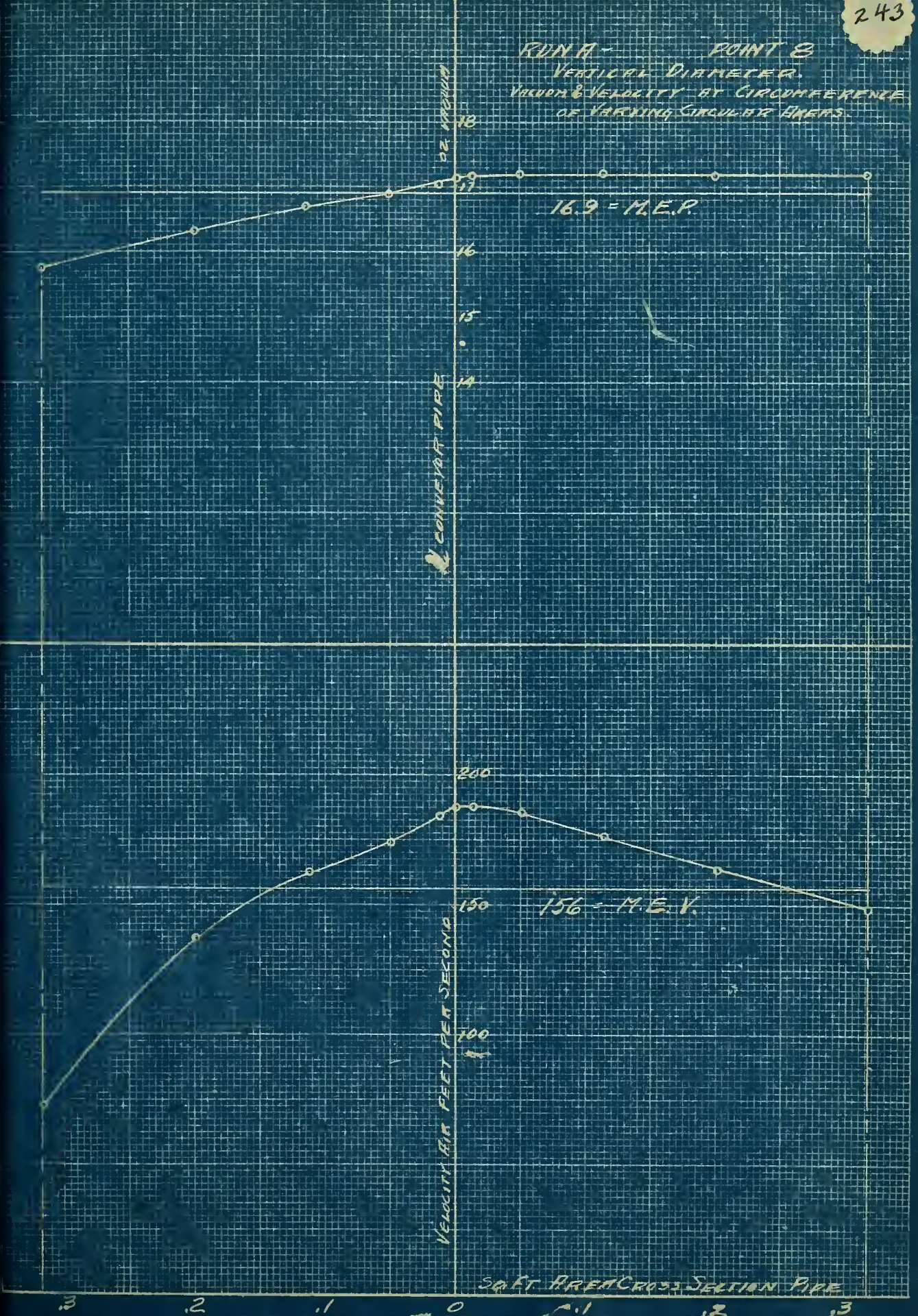
RUN A — POINT 7
45° DIAMETER
VACUUM & VELOCITY AT CIRCUMFERENCE
OF VARYING CIRCULAR AREAS.

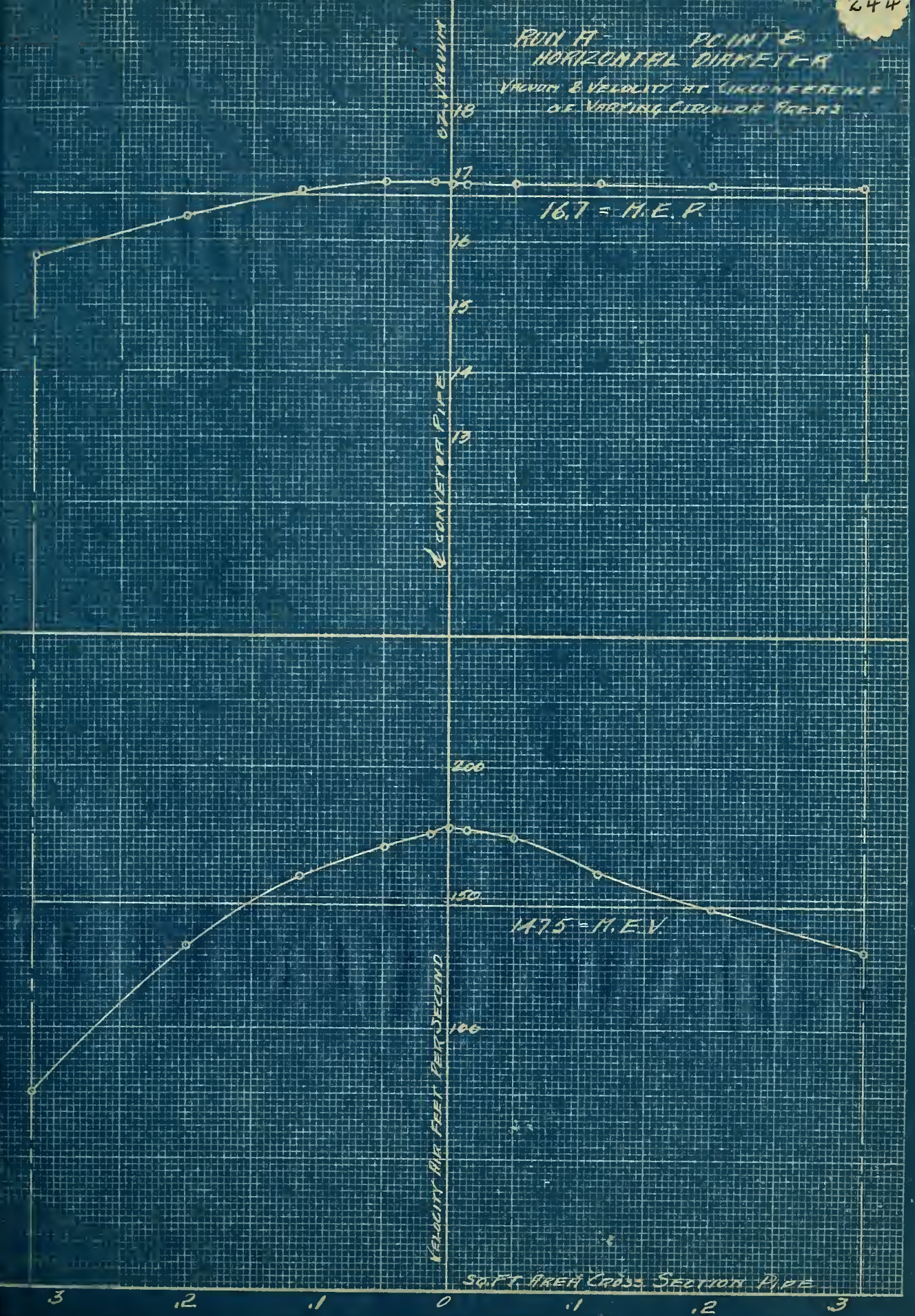


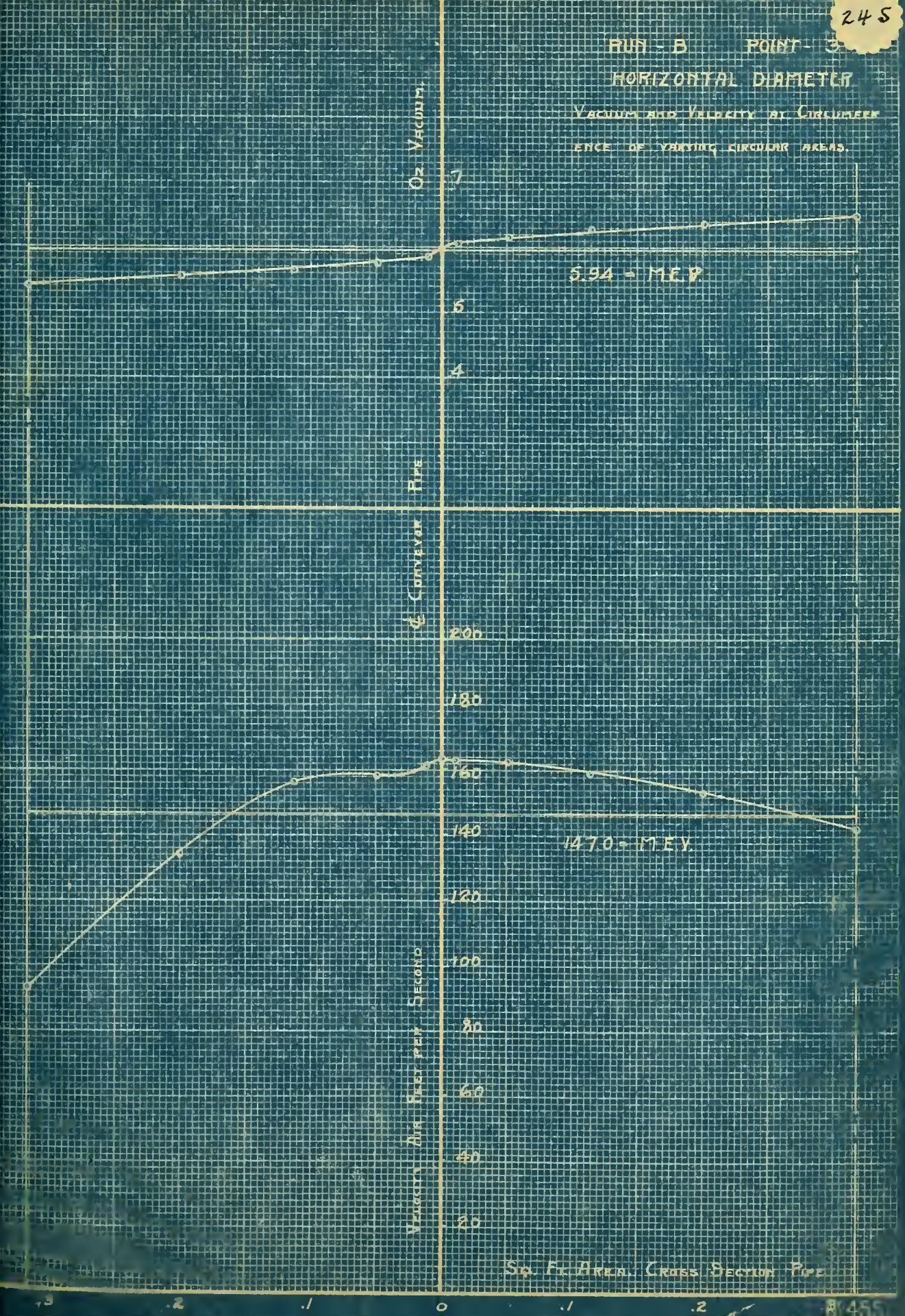

RUN A - POINT 7
VERTICAL DIAMETER
VACUUM & VELOCITY AT CENTER OF DRAFTING MOTOR FEET
OZ. VACUUM
14
13
13.4 = M.E.P
12
11
10
CENTER OF PIPE
100
150
140 = M.E.V.
100
50
VELOCITY AIR FEET PER SECOND
4 FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3

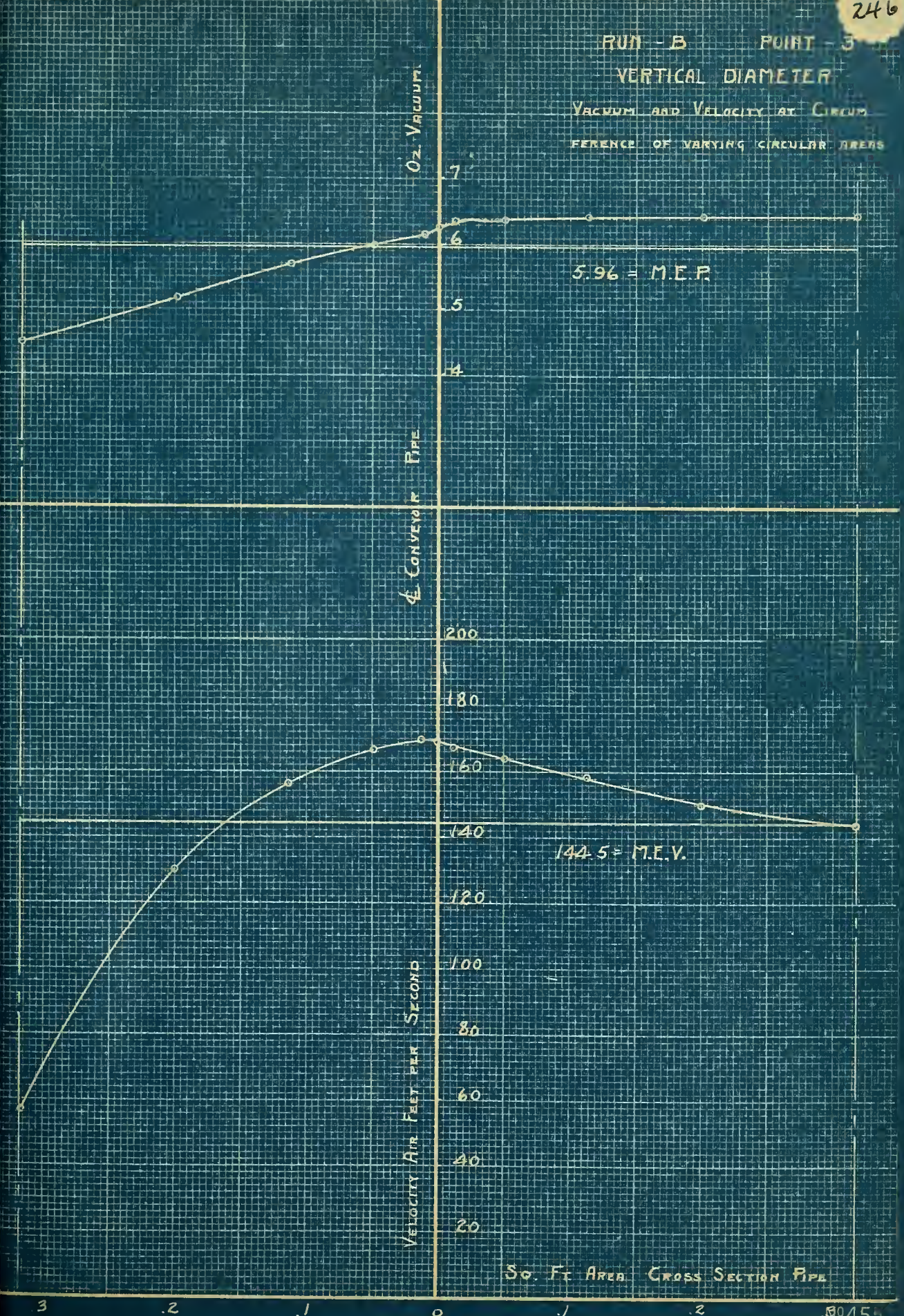

RUN 8
POINT 8
45° DIAMETER
Vacuum & Velocity at Equivalence of Moving Crosswind Fans
18
17
16
15
14
M.E.P.
CONDENSER PIPE
200
163.5 = M.E.V.
160
100
VELOCITY IN FEET PER SECOND
30 FT. FREE CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3

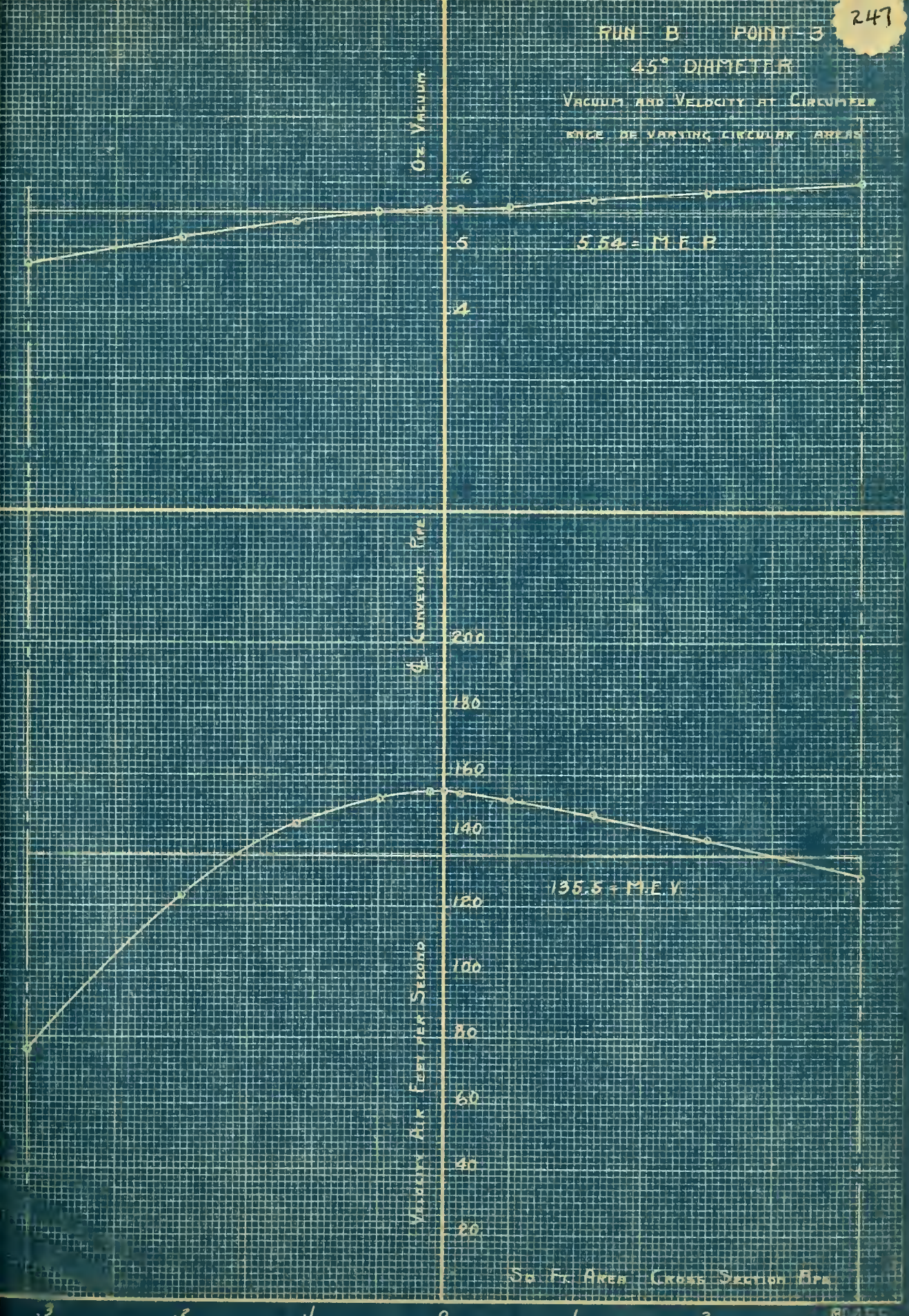

RUN A - POINT 8
45° DIAMETER
VACUUM & VELOCITY AT CIRCUMFERENCE
OF VARYING CIRCULAR BEEDS
18
17
16.7 = M.E.P.
16
15
200
150
14.7 = M.E.V.
100
.3
.2
.1
0
.1
.2
.3

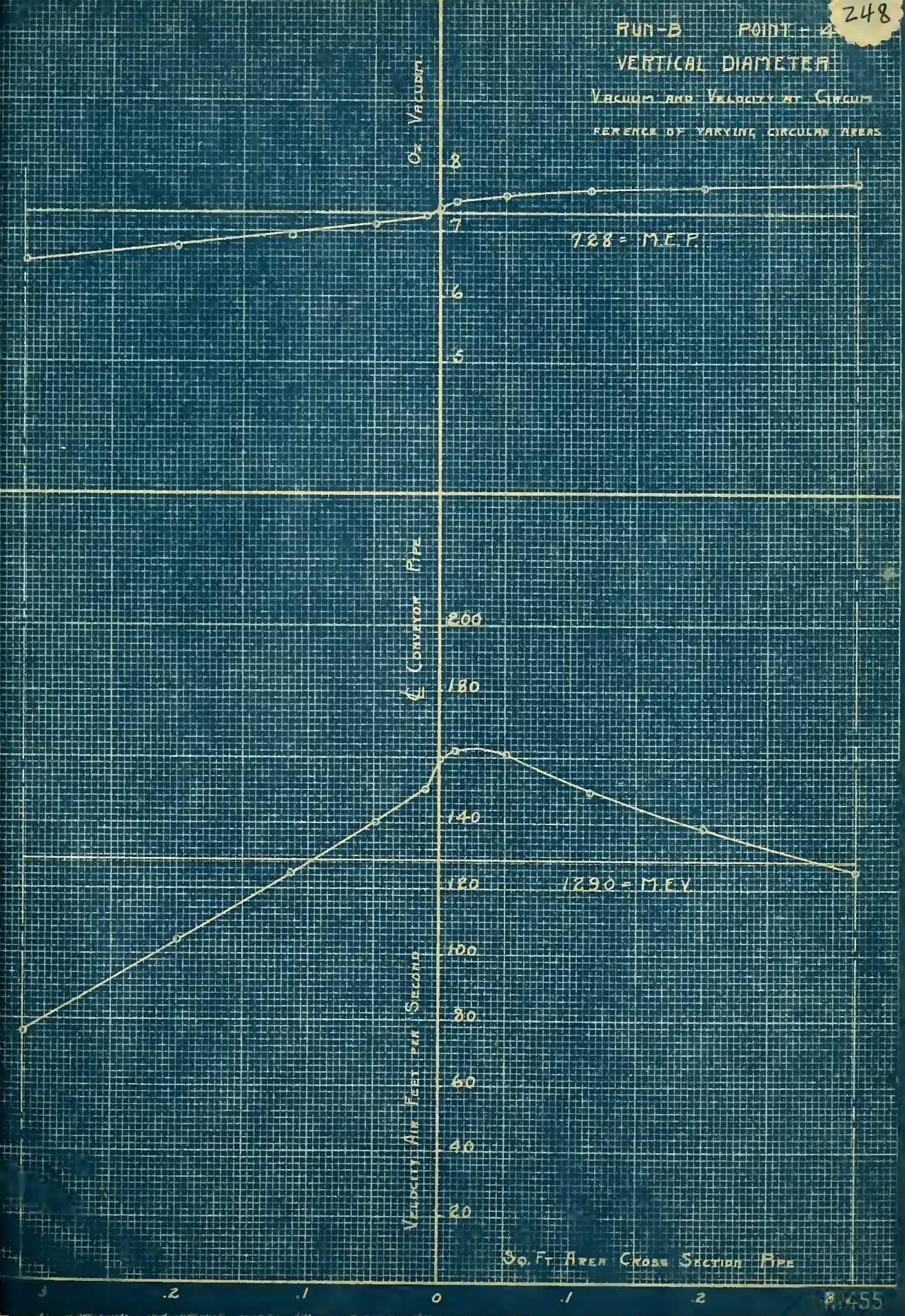

RUN A — POINT 8
VERTICAL DIAMETER.
VACUUM & VELOCITY AT CIRCUMFERENCE
OF VARYING CIRCULAR AREAS.
16.9 = M.E.P.
156 = M.E.V.
VACUUM IN INCHES OF MERCURY
VELOCITY IN FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
18
17
16
15
14
200
150
100
.3
.2
.1
0
.1
.2
.3

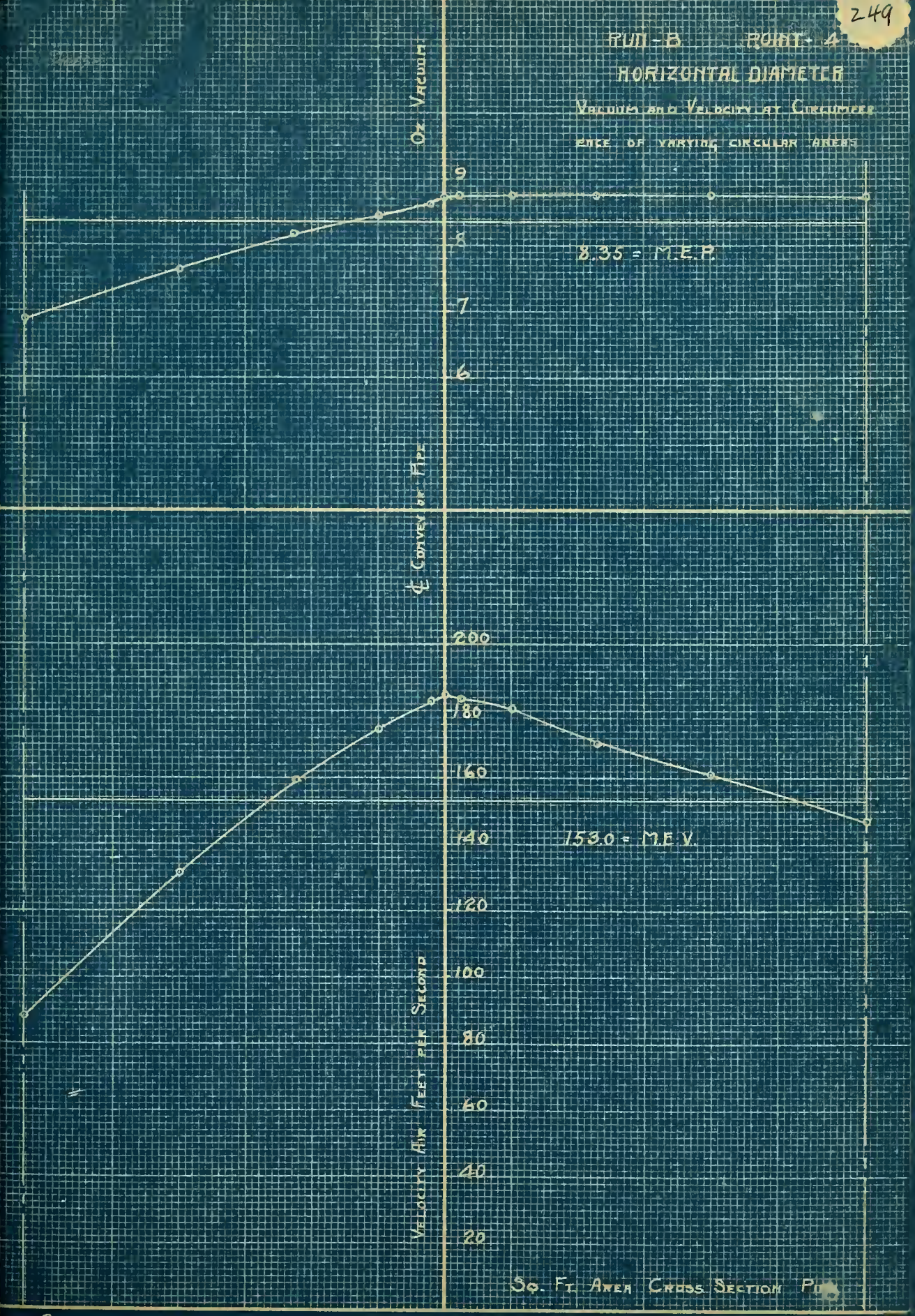

RUN A - POINT E
HORIZONTAL DIAMETER
VACUUM & VELOCITY AT CIRCUMFERENCE
OF VARYING CIRCULAR AREAS
OZ. VACUUM
18
17
16.7 = M.E.P.
16
15
14
13
CONVERGING PIPE
200
150
147.5 = M.E.V.
100
VELOCITY - MM FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3

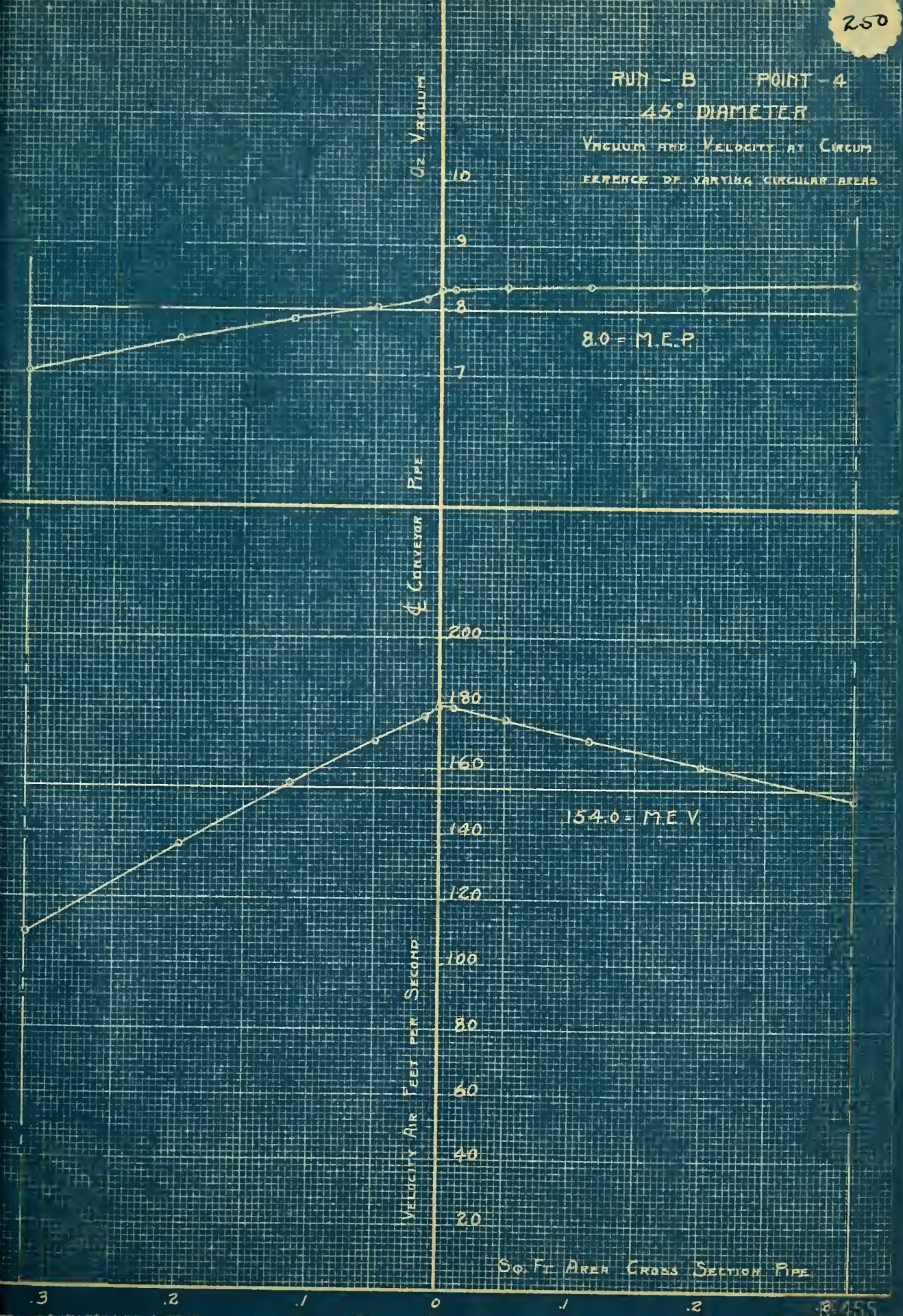

RUN - B POINT - 3
HORIZONTAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS.
Oz VACUUM
.7
.6
.5
.4
5.94 = M.E.P.
℄ CONVEYOR PIPE
200
180
160
140
120
100
80
60
40
20
147.0 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2

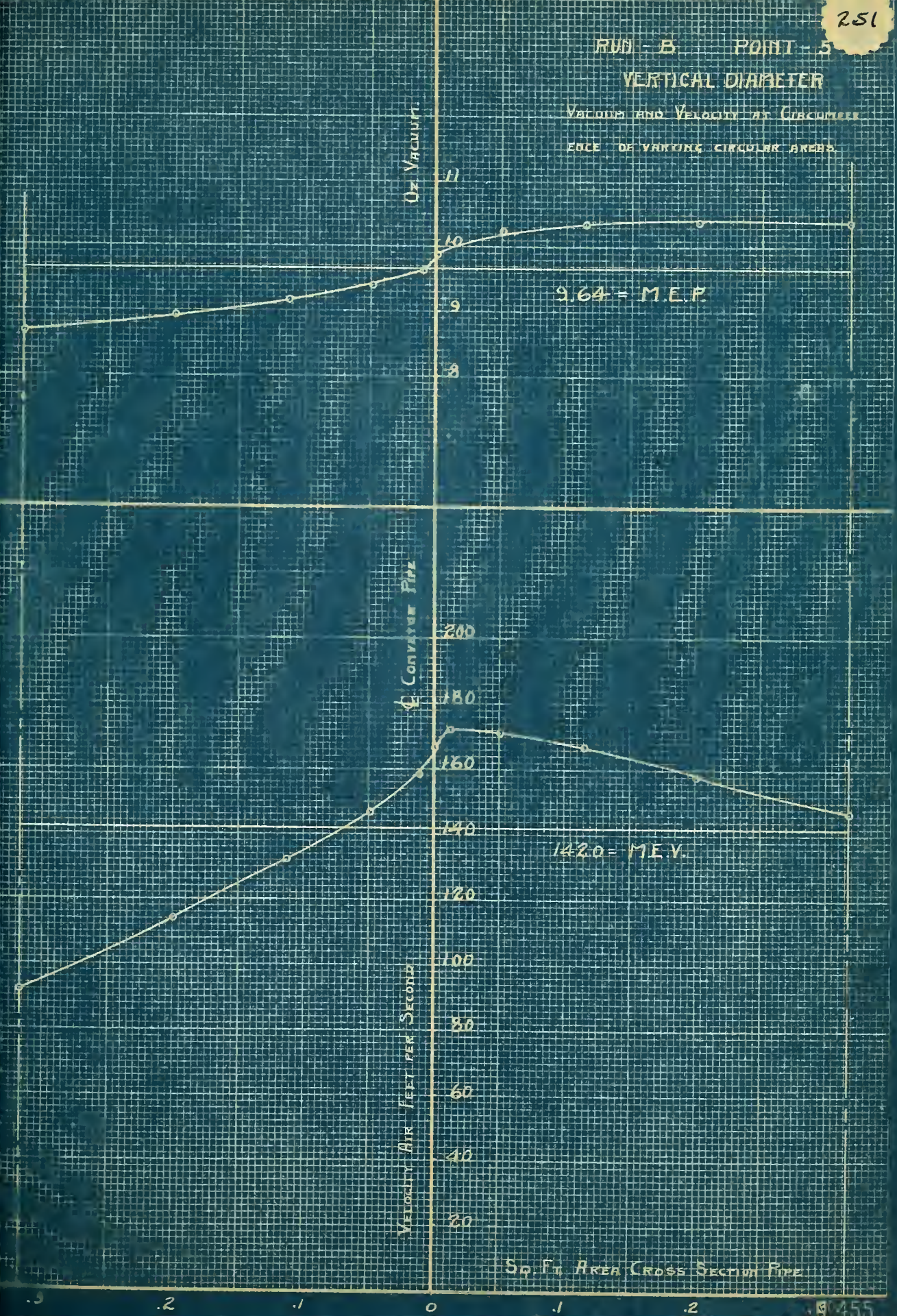

RUN - B POINT - 3
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS
OZ. VACUUM
7
6
5
4
5.96 = M.E.P.
℄ CONVEYOR PIPE
200
180
160
140
144.5 = M.E.V.
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3


RUN B POINT 3
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS
OZ. VACUUM
.6
.6
.4
5.54 = M.E.P.
CONVEYOR FAN
200
180
160
140
120
100
80
60
40
20
135.5 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION AIR
.3
.2
.1
0
.1
.2


RUN-B POINT - 4
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIRCUM
FERENCE OF VARYING CIRCULAR AREAS
OZ. VACUUM
8
7
6
5
7.28 = M.E.P.
℄ CONVERTER PIPE
200
180
140
120
100
80
60
40
20
1290 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.2
.1
0
.1
.2
B1455


RUN - B POINT - 4
HORIZONTAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE
SIZE OF VARYING CIRCULAR AREAS
OR VACUUM
9
8
7
6
8.35 = M.E.P.
CONVERTED INTO
200
180
160
140
120
100
80
60
40
20
153.0 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PU
.3
.2
.1
0
.1
.2
.3
No 455


RUN - B POINT - 4
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS
OZ VACUUM
10
9
8
7
8.0 = M.E.P
℄ CONVEYOR PIPE
200
180
160
140
120
100
80
60
40
20
154.0 = M.E.V
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3

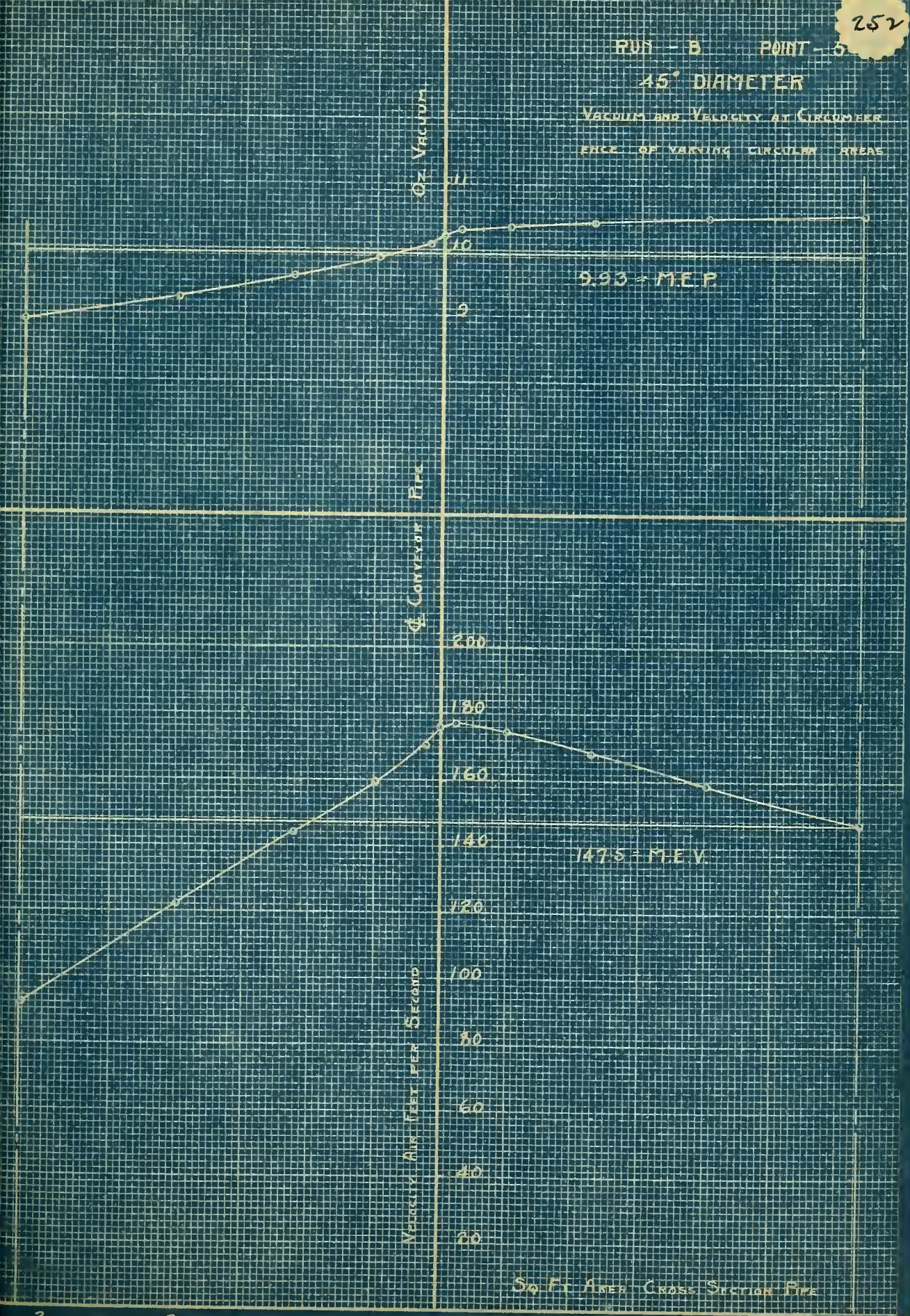

RUN - B POINT - 5
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE
EDGE OF VARYING CIRCULAR AREAS.
OZ. VACUUM.
11
10
9
8
9.64 = M.E.P.
CONVERGER PIPE
200
180
160
140
120
100
80
60
40
20
142.0 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3

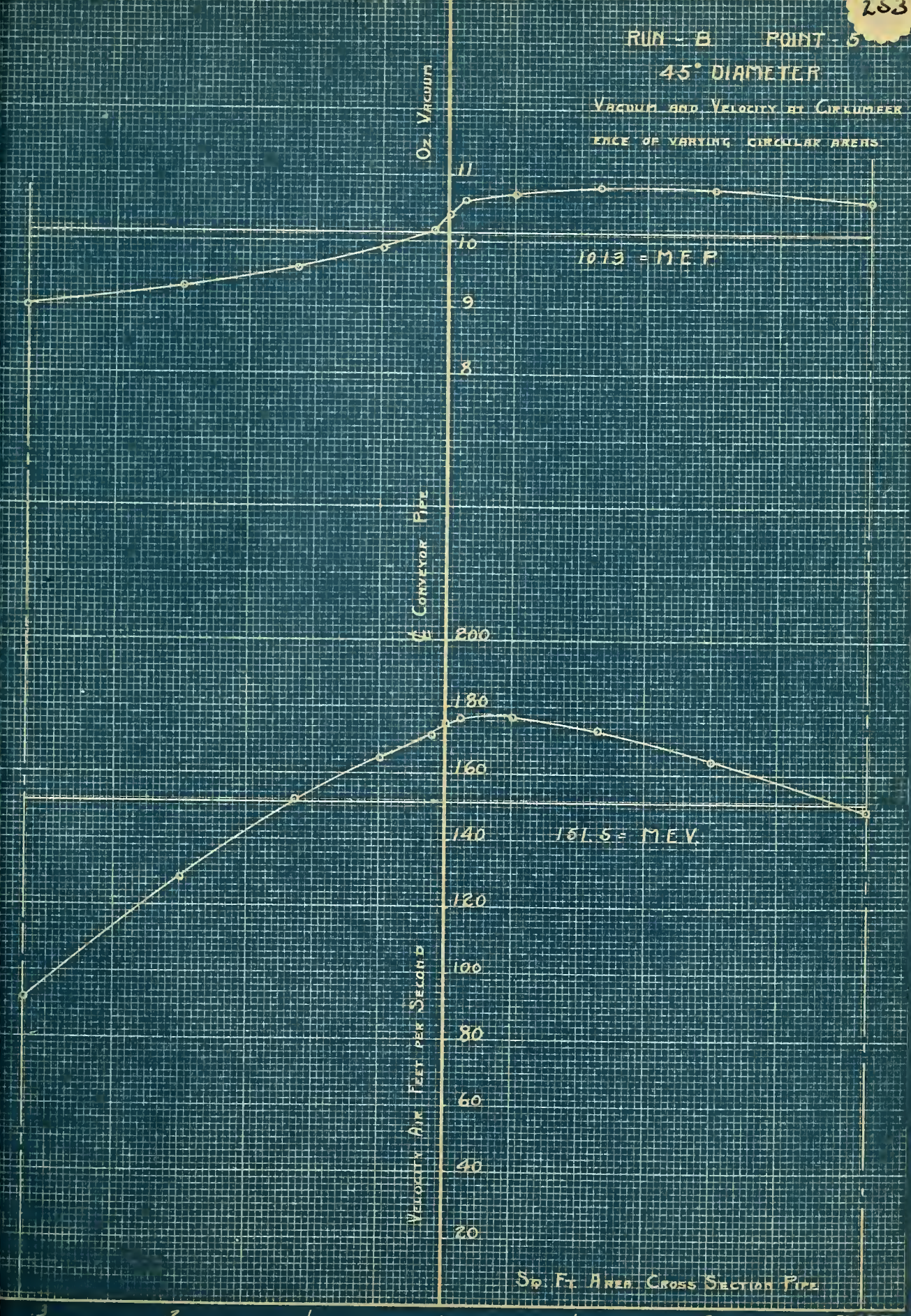
RUN - B POINT - 5

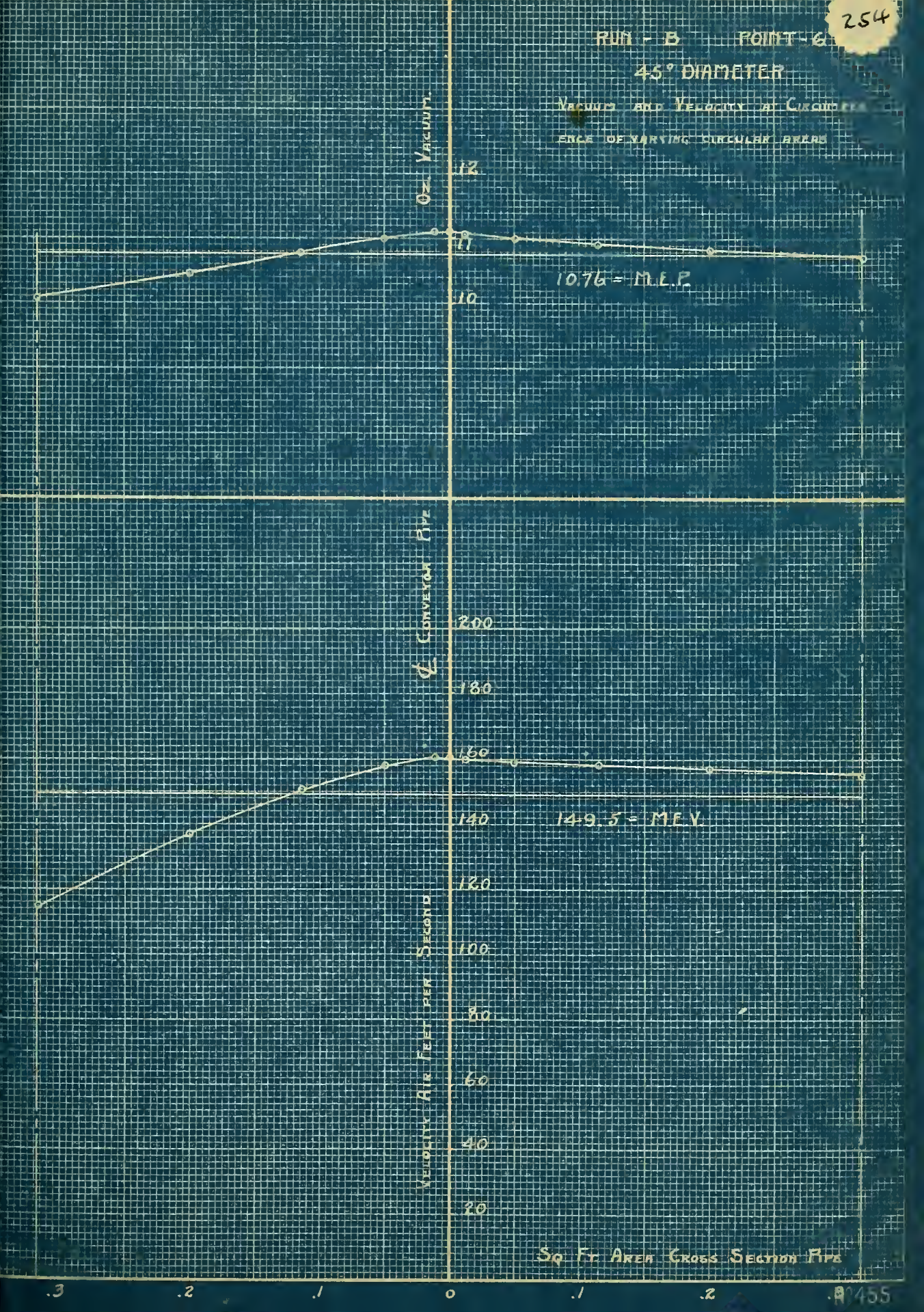
45" DIAMETER

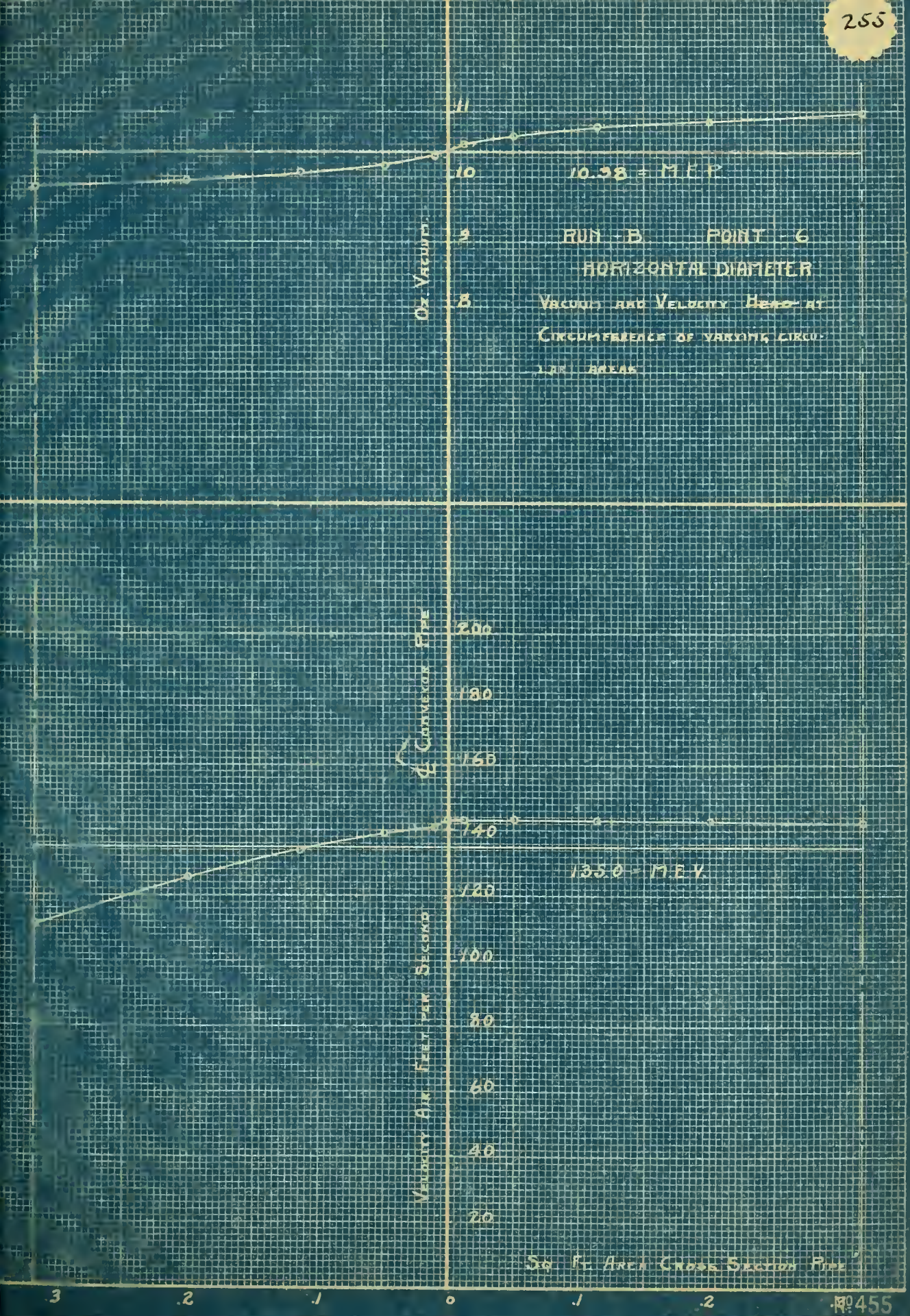
VACUUM AND VELOCITY AT CIRCUMFERENCE

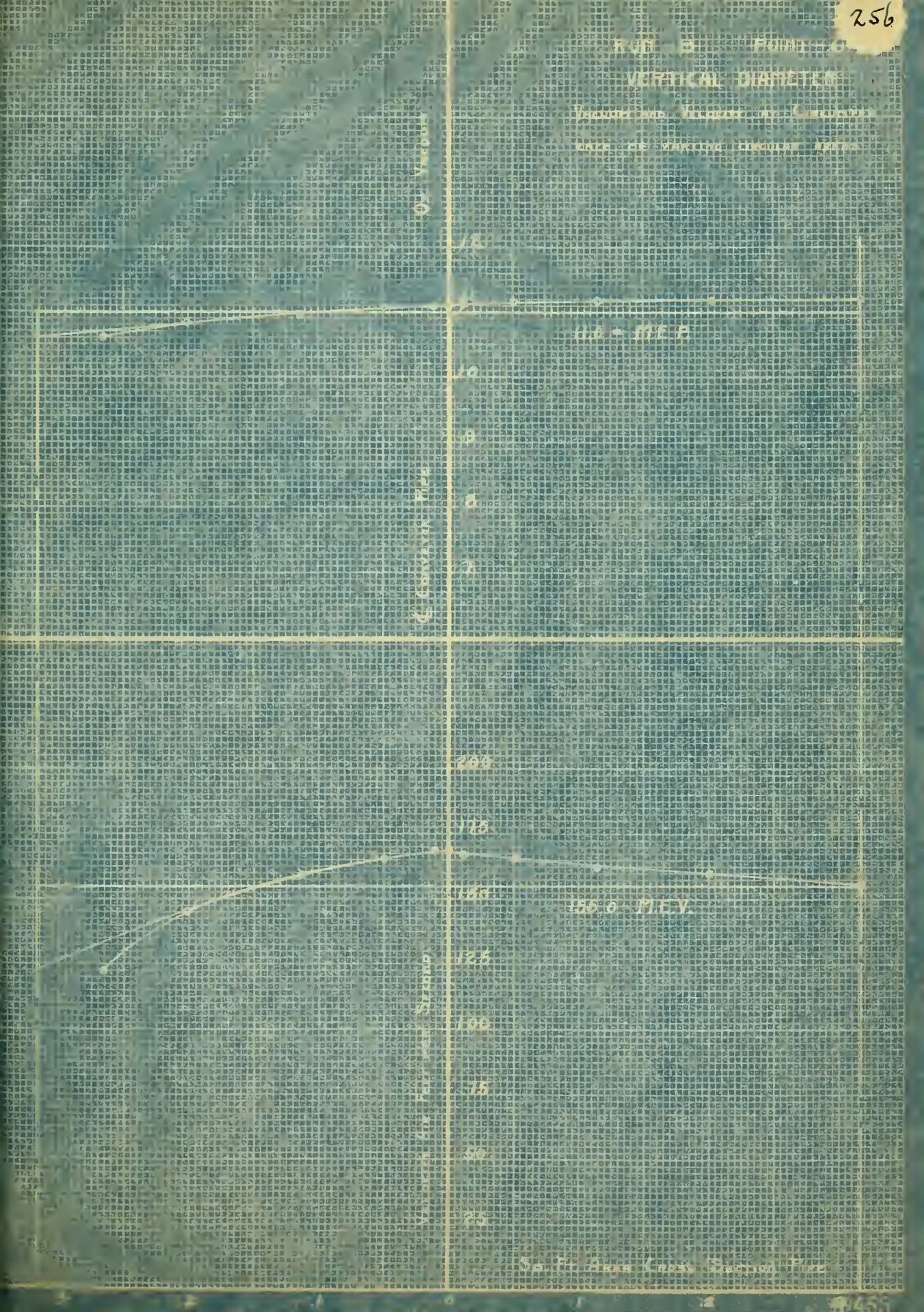
FACE OF VARYING CIRCULAR AREAS

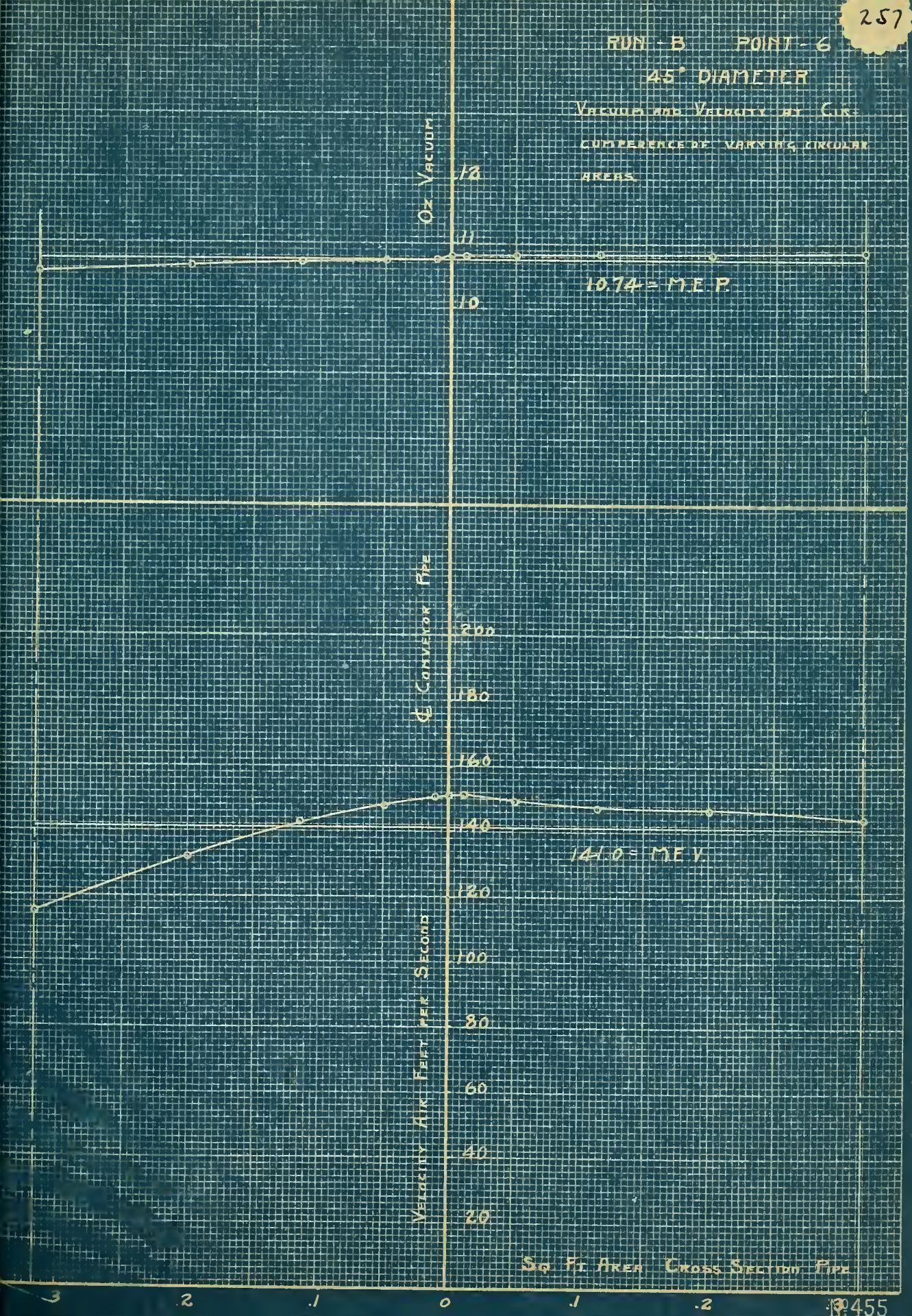


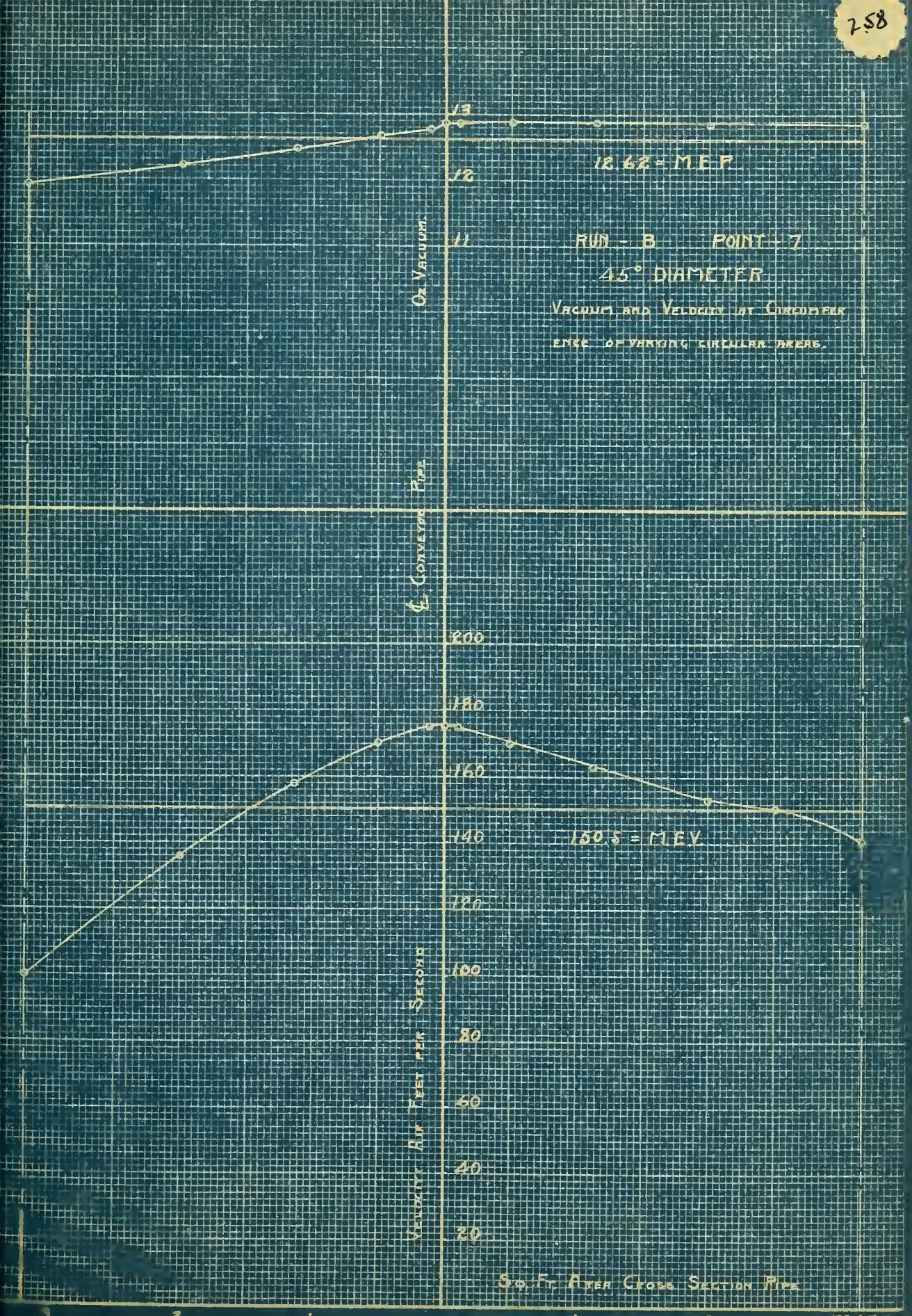

RUN - B POINT - 5
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE
FACE OF VARYING CIRCULAR AREAS
OZ. VACUUM
11
10
9
8
101.3 = M.E.P.
CONVEYOR PIPE
200
180
160
140
120
100
80
60
40
20
161.5 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3


RUN - B POINT - 6
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS
OZ. VACUUM
12
11
10
10.76 = M.E.P.
Q CONVEYOR PIPE
200
180
160
140
149.5 = M.E.V.
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3


10.38 = M.E.P.
RUN - B
POINT - 6
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEAD AT
CIRCUMFERENCE OF VARYING CIRCULAR AREAS
OZ. VACUUM
11
10
9
8
VELOCITY HEAD IN FEET PER SECOND
200
180
160
140
120
100
80
60
40
20
135.0 = M.E.V.
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
No 455



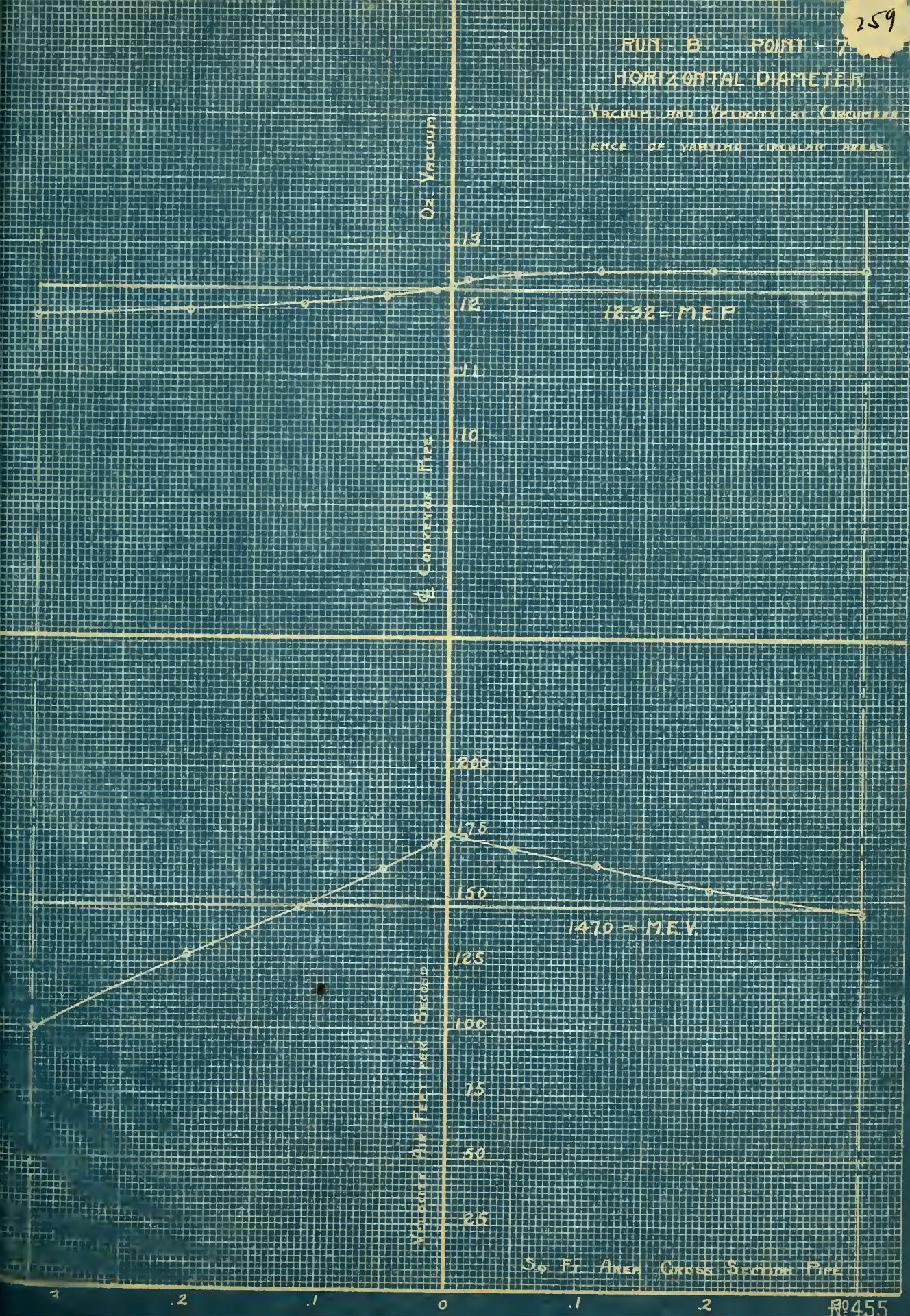

RUN - B POINT - 6
45" DIAMETER
VACUUM AND VELOCITY BY CIRCUMFERENCE OF VARYING CIRCULAR AREAS
OZ VACUUM
12
11
10
10.74 = M.E.P.
℄ CONVEYOR PIPE
200
180
160
140
141.0 = M.E.V.
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
30455

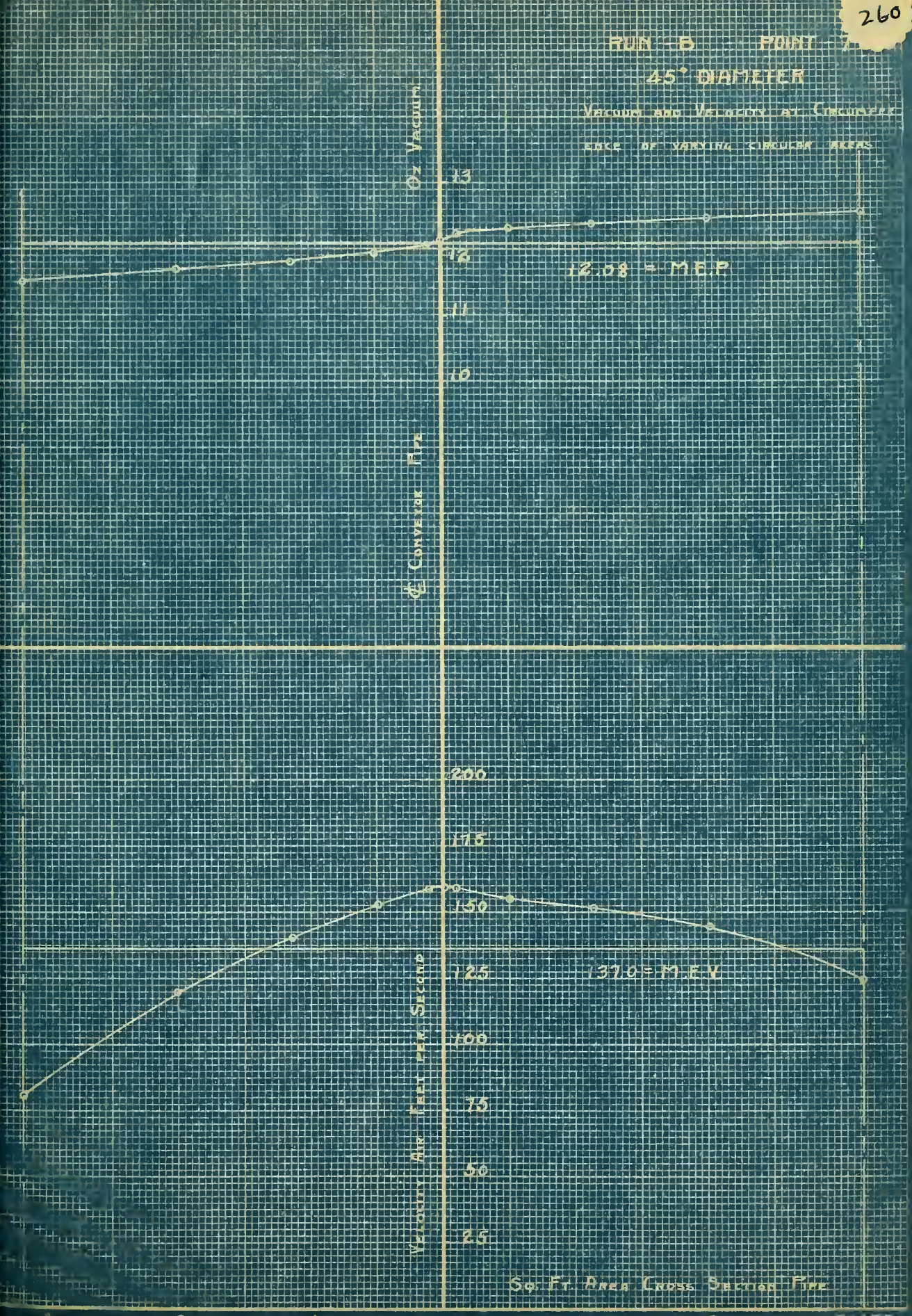

13
12
11
12.62 = M.E.P.
RUN - B POINT - 7
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS.
OF VACUUM.
℄ CONVEYING PIPE
200
180
160
140
120
100
80
60
40
20
150.5 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
No 455

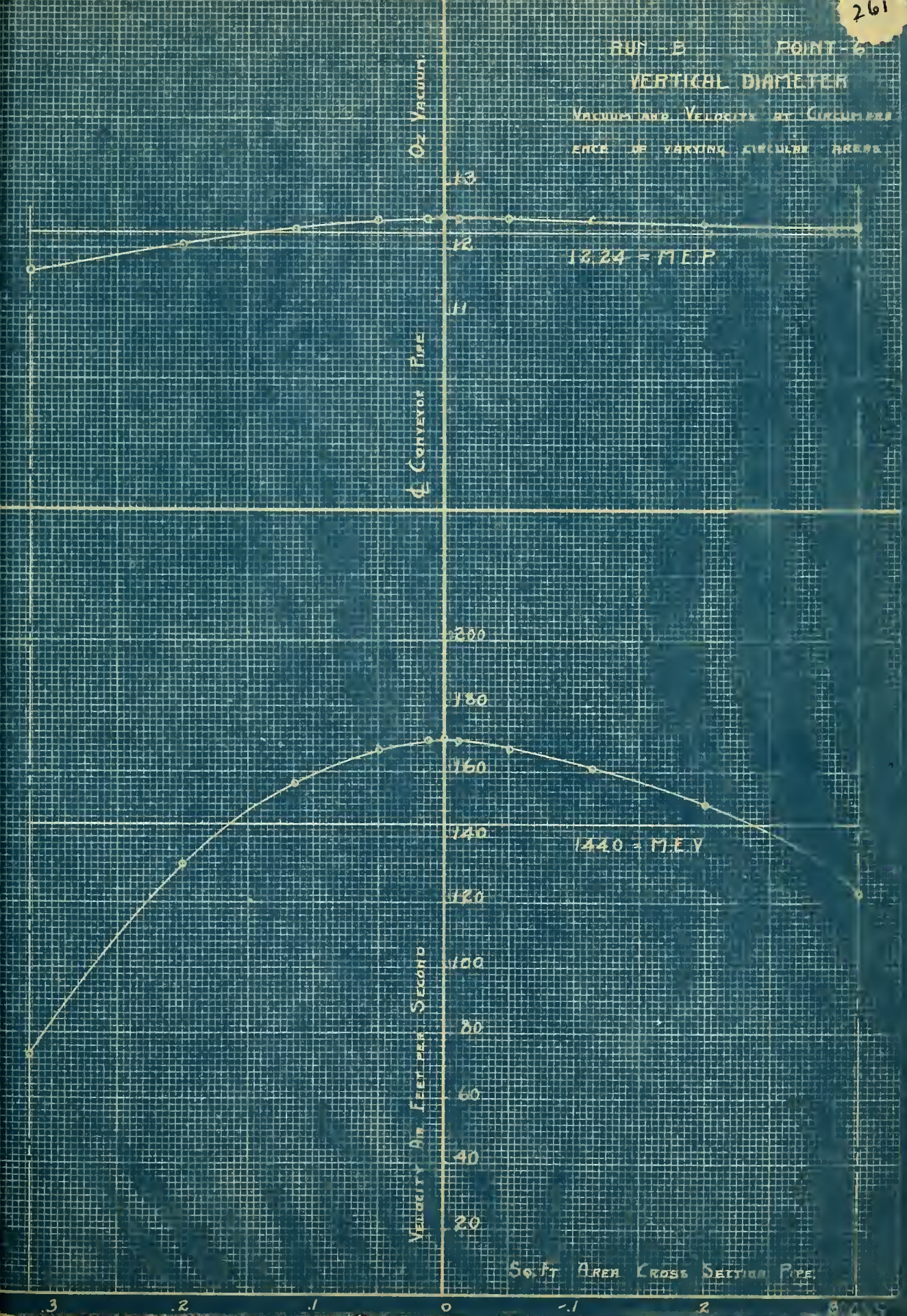
RUN B POINT - 7

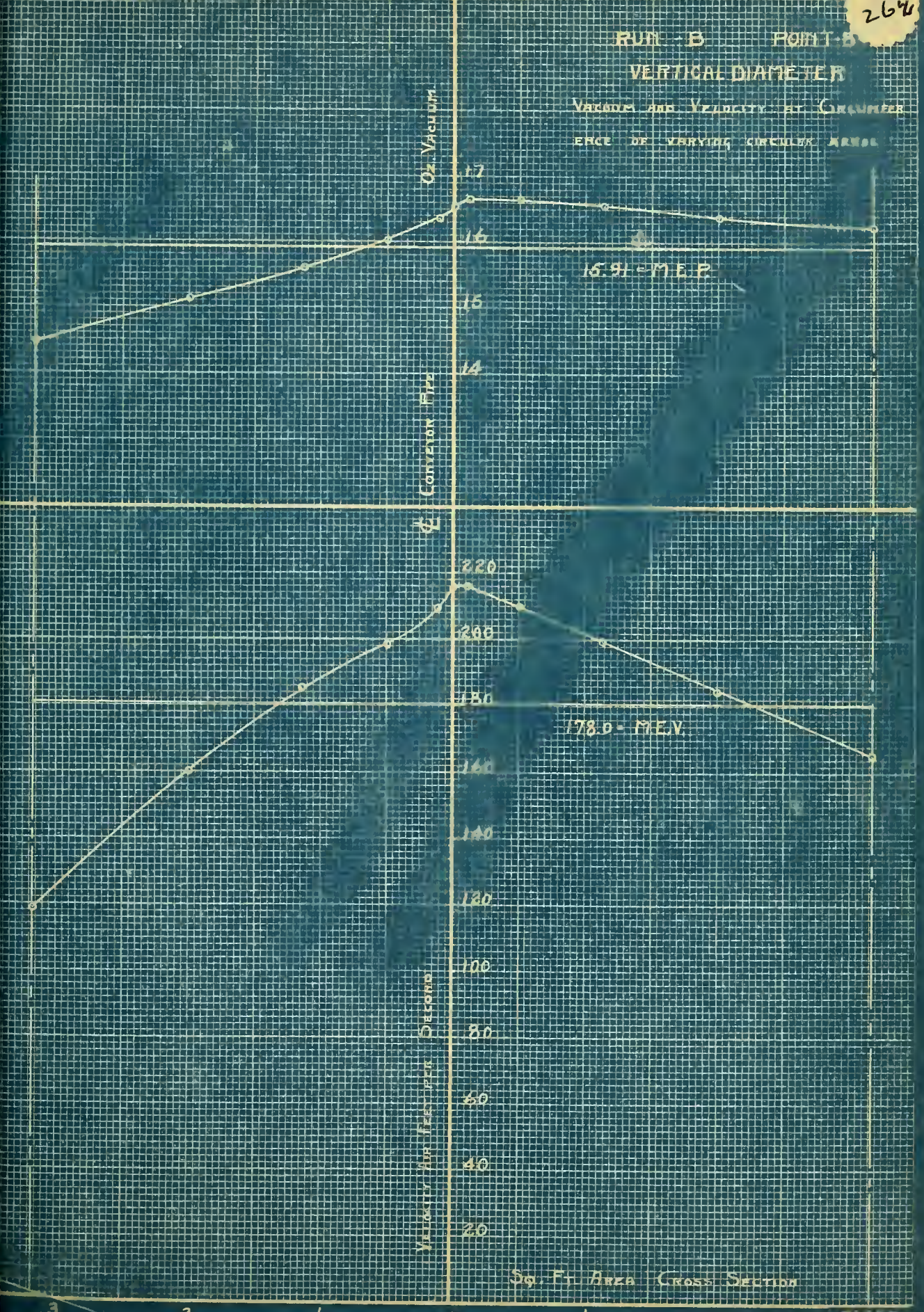
HORIZONTAL DIAMETER

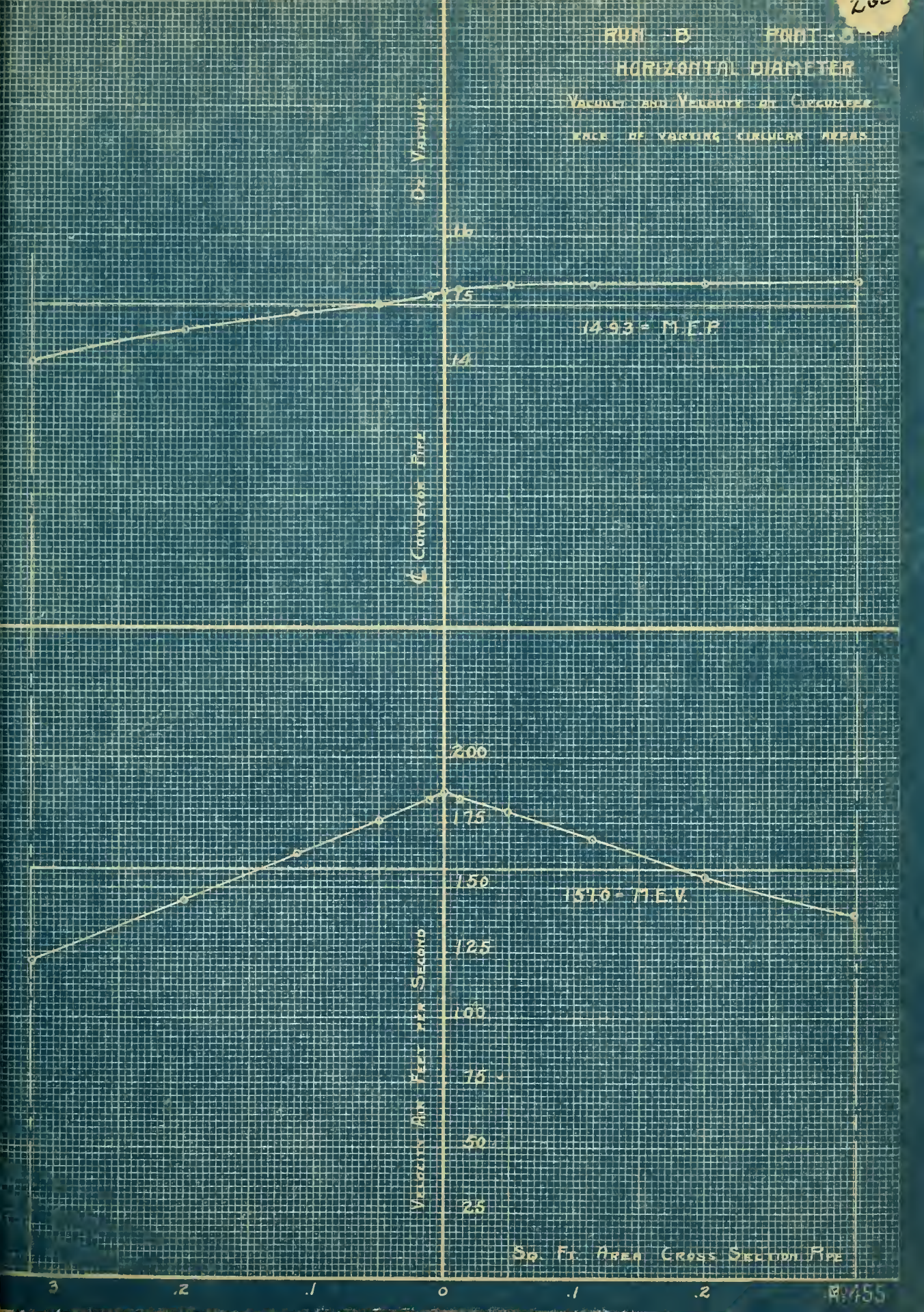
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS




RUN - B
POINT
45" DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE
FOR VARYING CIRCULAR AREAS
OZ VACUUM
13
12
11
10
12.08 = M.E.P
℄ CONVERGENT FLUE
200
175
150
125
100
75
50
25
1370 = M.E.V
VELOCITY FEET PER SECOND
SQ. FT. AREA CROSS SECTION FLUE
.3
.2
.1
0
.1
.2
R 455


RUN - B
POINT - 6
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS
Q VACUUM
13
12
11
12.24 = M.E.P.
℄ CONVEYOR PIPE
200
180
160
140
120
100
80
60
40
20
144.0 = M.E.V.
VELOCITY IN FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
-.1
.2


RUN - B POINT - B
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS
Oz. Vacuum
17
16
15
14
16.91 = M.E.P.
Oz. Compressed Air
220
200
180
160
140
120
100
80
60
40
20
178.0 = M.E.V.
Velocity Feet per Second
Sq. Ft. Area Cross Section
.3
.2
.1
0
.1
.2
R455

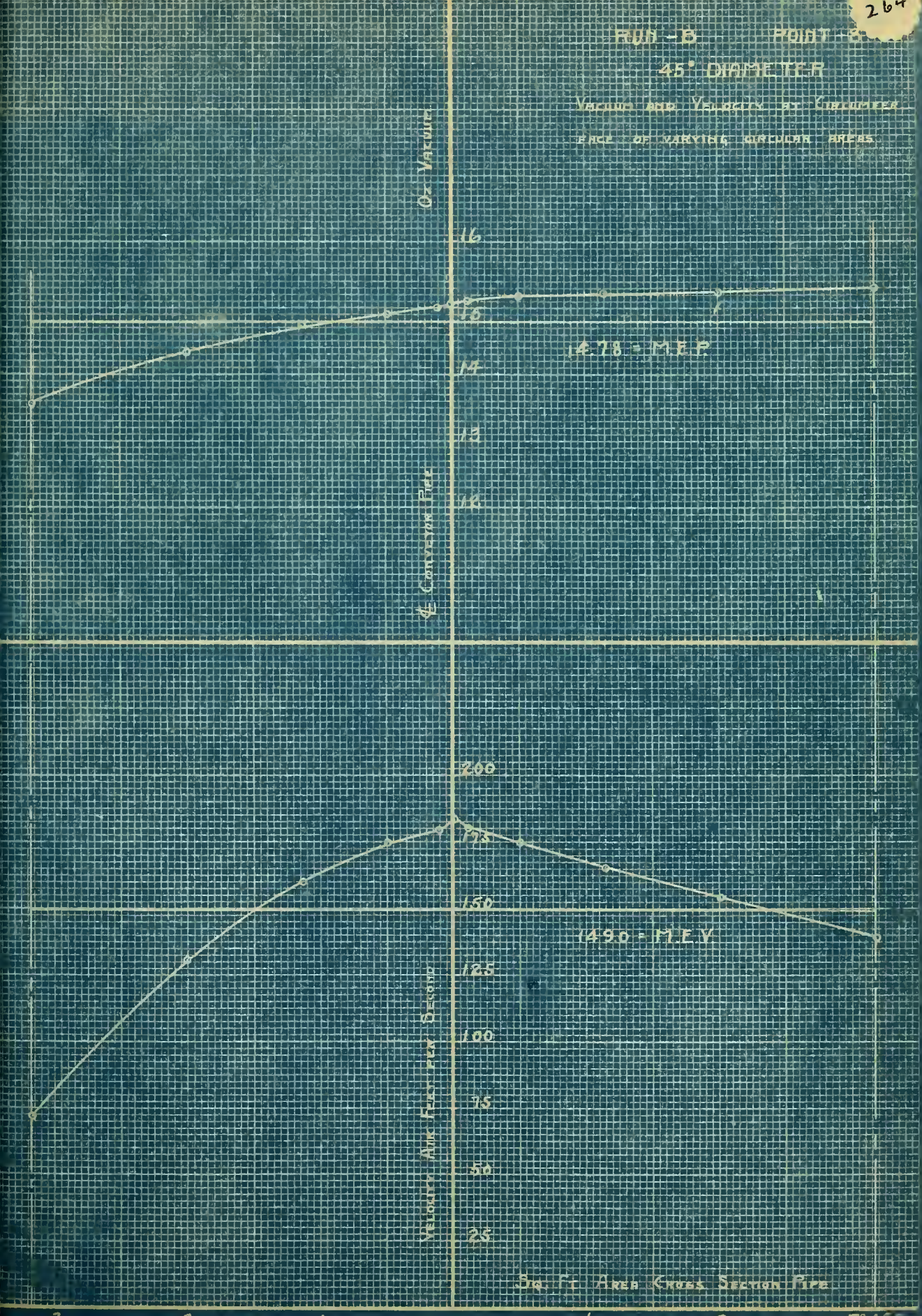

RUN - B
HORIZONTAL DIAMETER
Vacuum and Velocity on Circumference
face of varying circular areas
Or Vacuum
16
15
14.93 = M.E.P
14
Conveyor Pipe
200
175
150
125
100
75
50
25
Velocity in Feet per Second
15.10 = M.E.V.
Sq. Ft. Area Cross Section Pipe
.3
.2
.1
0
.1
.2

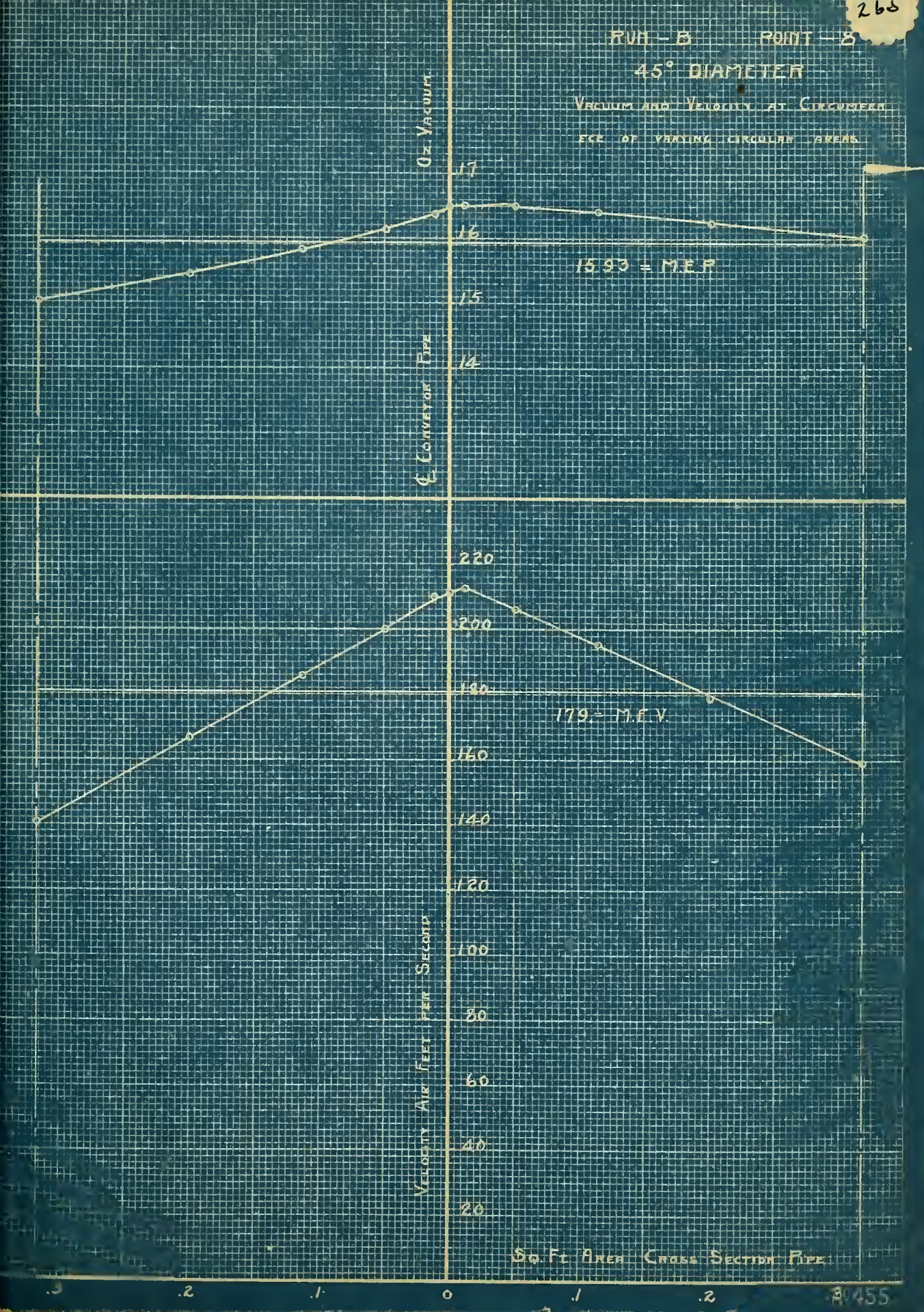
RUN - B POINT - 8

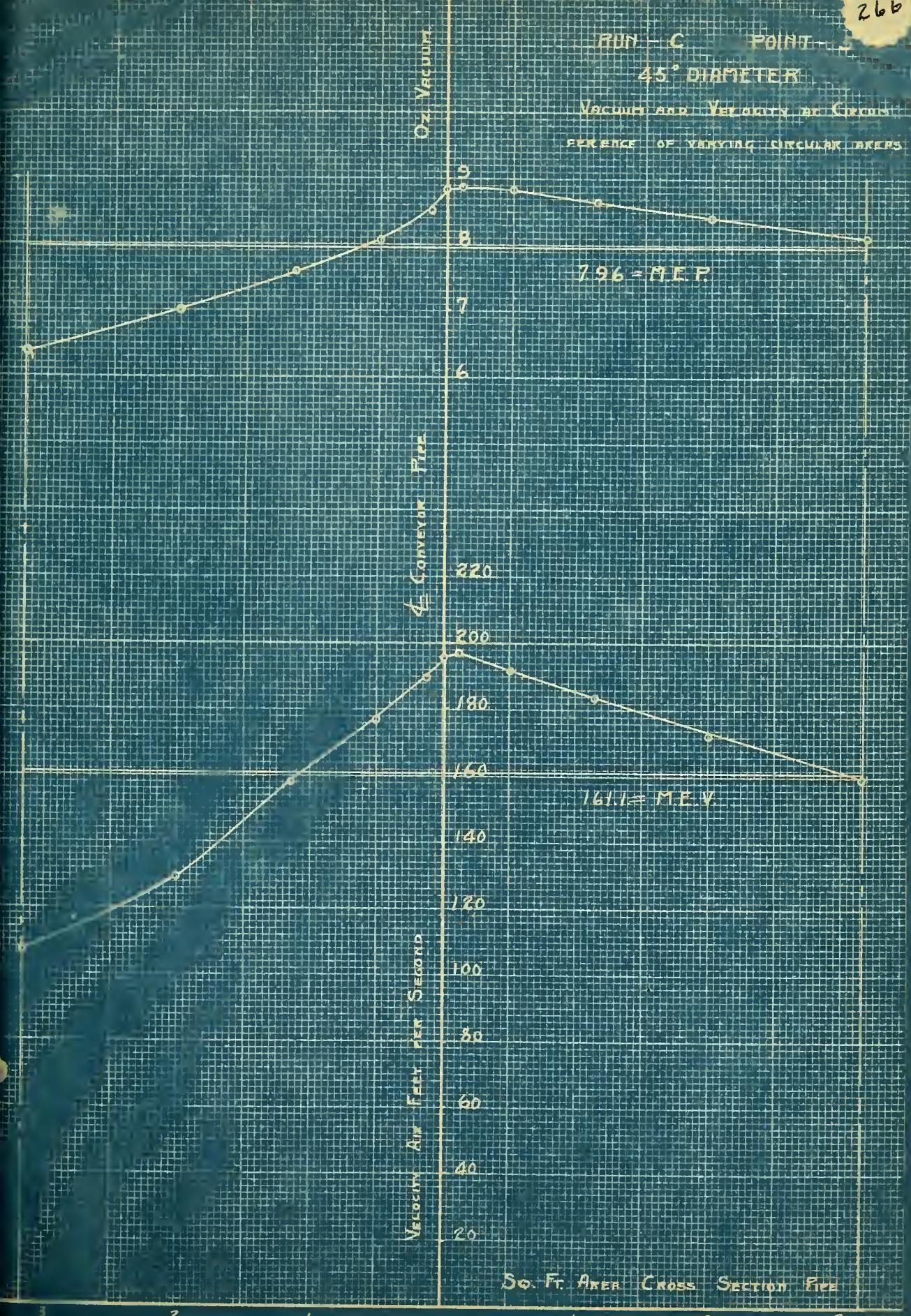
45" DIAMETER

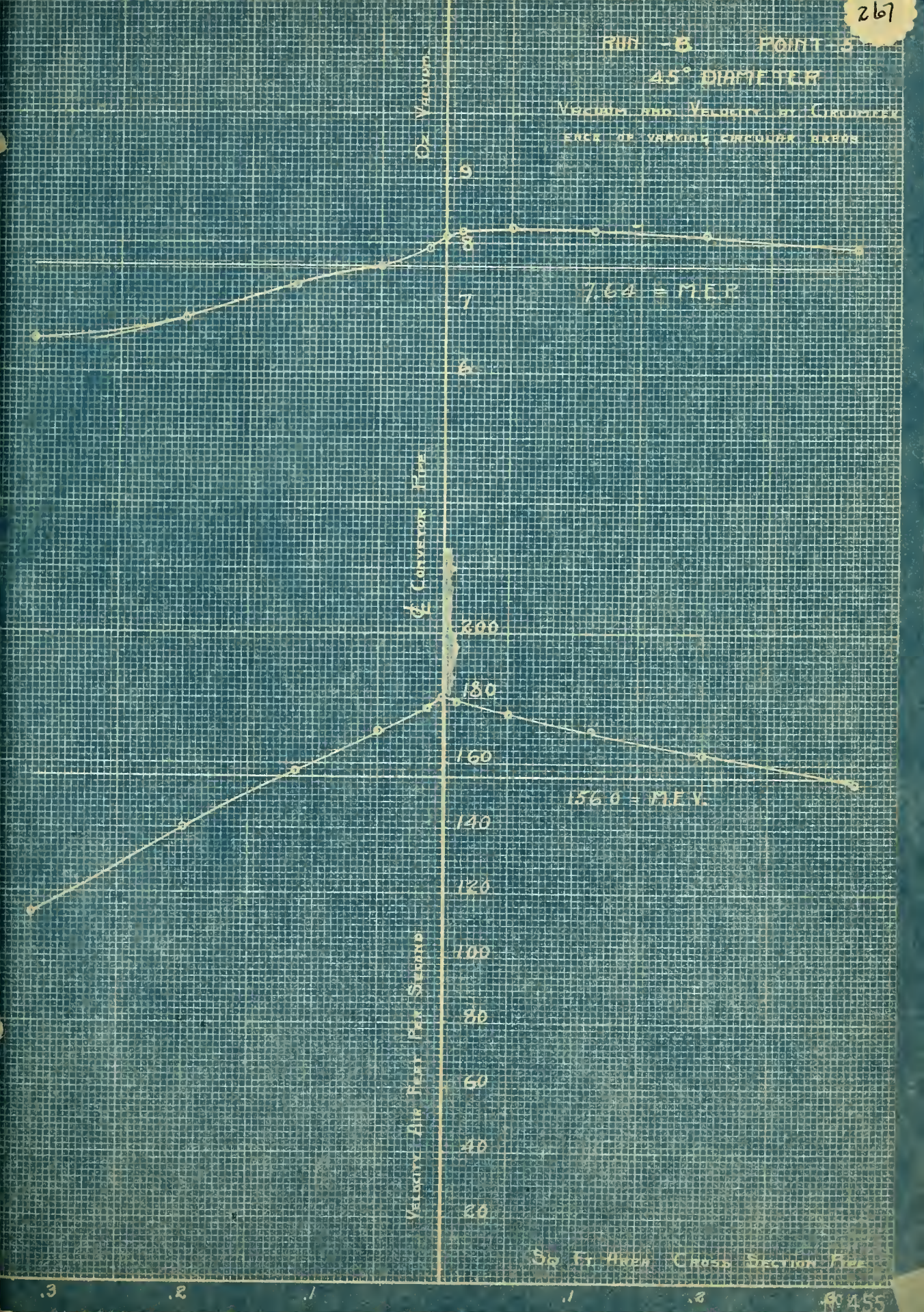
VACUUM AND VELOCITY AT CIRCUMFERENCE

FACE OF VARYING CIRCULAR AREAS




RUN - B POINT - B
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS
OZ. VACUUM
17
16
15.93 = MEP
15
14
℄ CONVEYOR PIPE
220
200
180
179 = M.E.V.
160
140
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
3455


RUN — C POINT —
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS
OZ. VACUUM
9
8
7.96 = M.E.P.
7
6
4 CONVERGENT PIPE
220
200
180
160
161.1 = M.E.V.
140
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.2
.1
.1
.2
.3
455


RUN - 8
POINT - 8
45° DIAMETER
Vacuum and Velocity by Gauge
Back of varying circular areas
On Vacuum
9
8
7
6
7.64 = M.E.R.
Of Collector Tube
200
180
160
140
120
100
80
60
40
20
156.0 = M.E.V.
Velocity Air Flow per Second
So Ft Area Cross Section Pipe
.3
.2
.1
.1
.2
.3

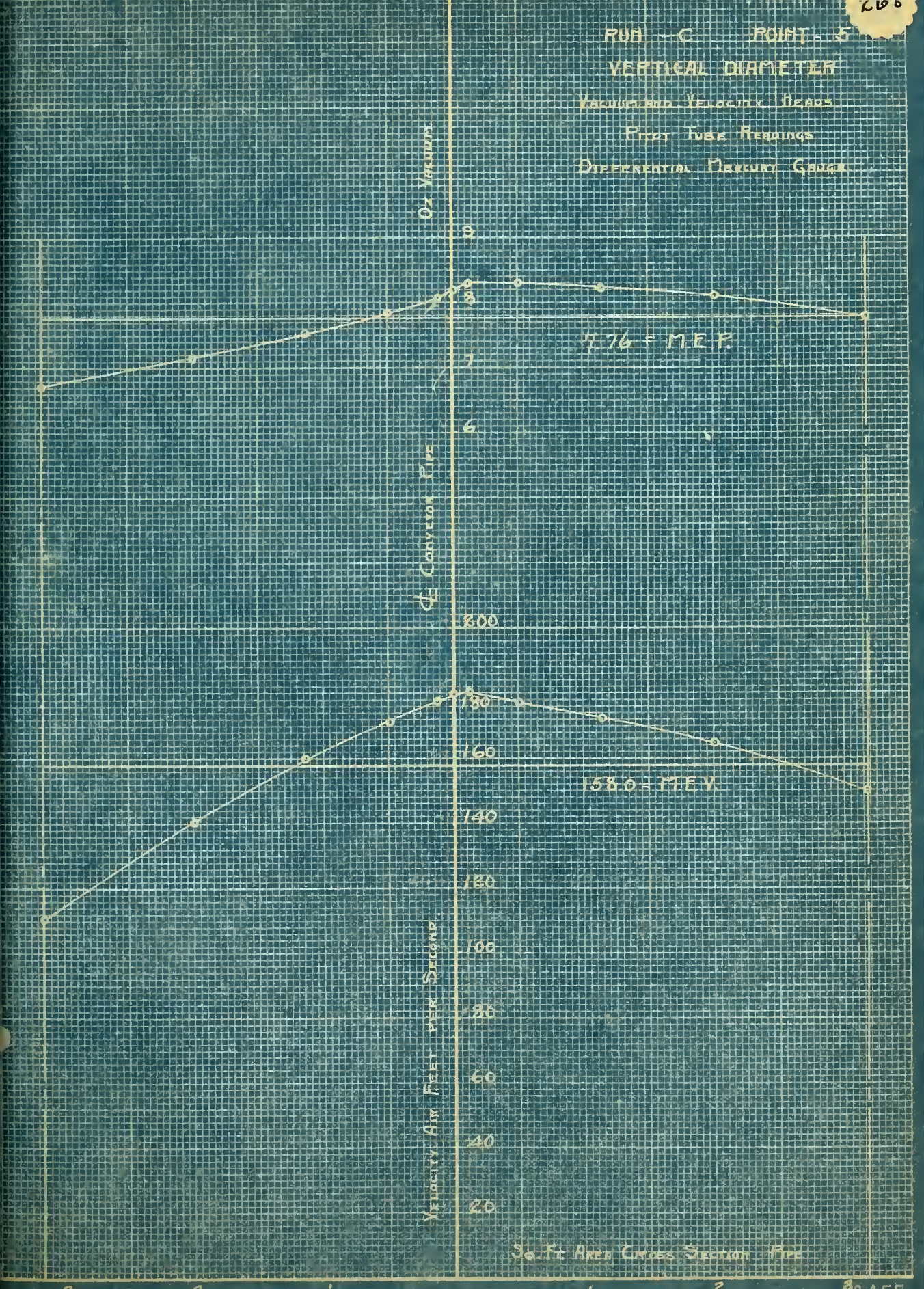
RUN — C POINT — 5

VERTICAL DIAMETER

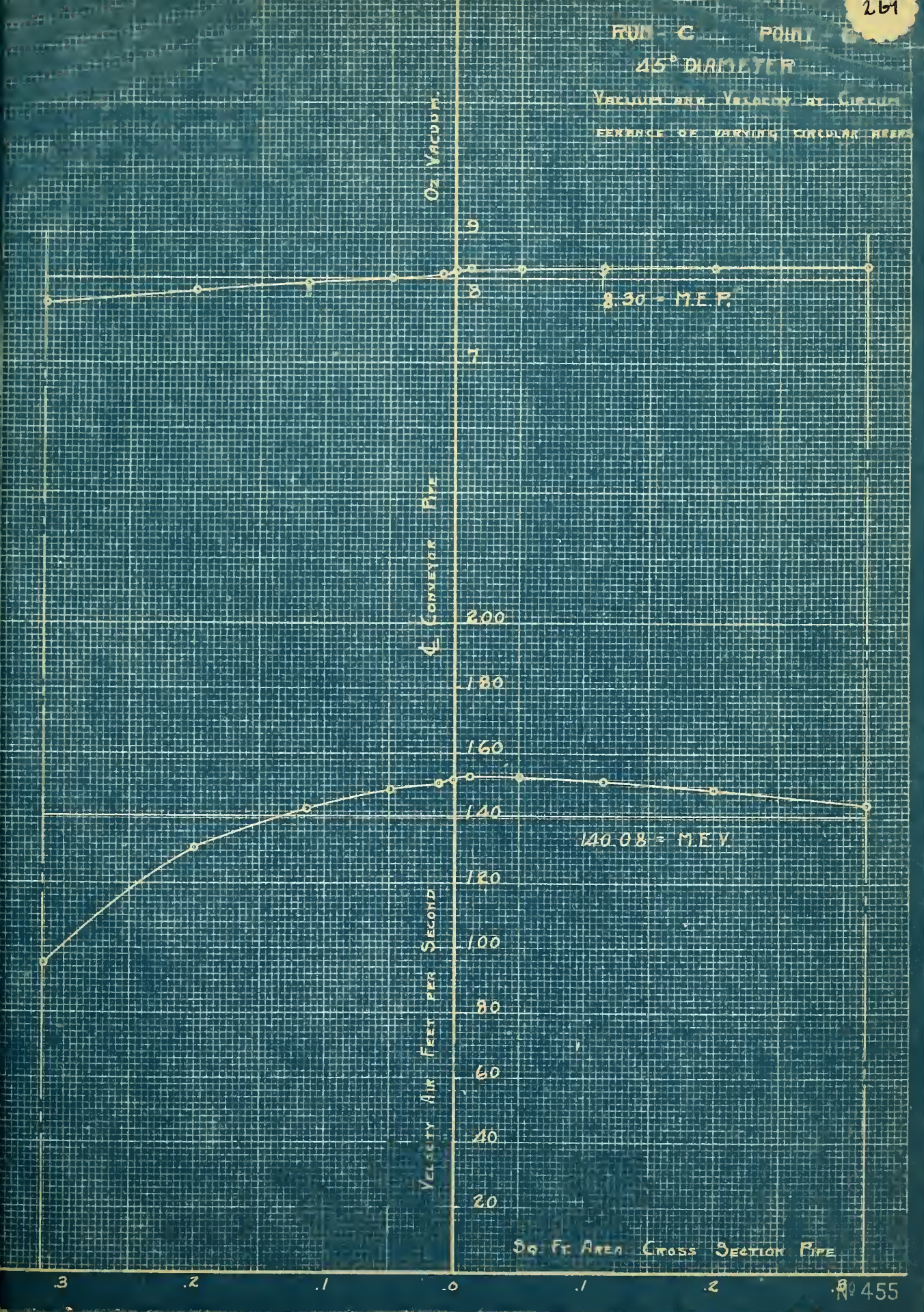
VACUUM AND VELOCITY HEADS

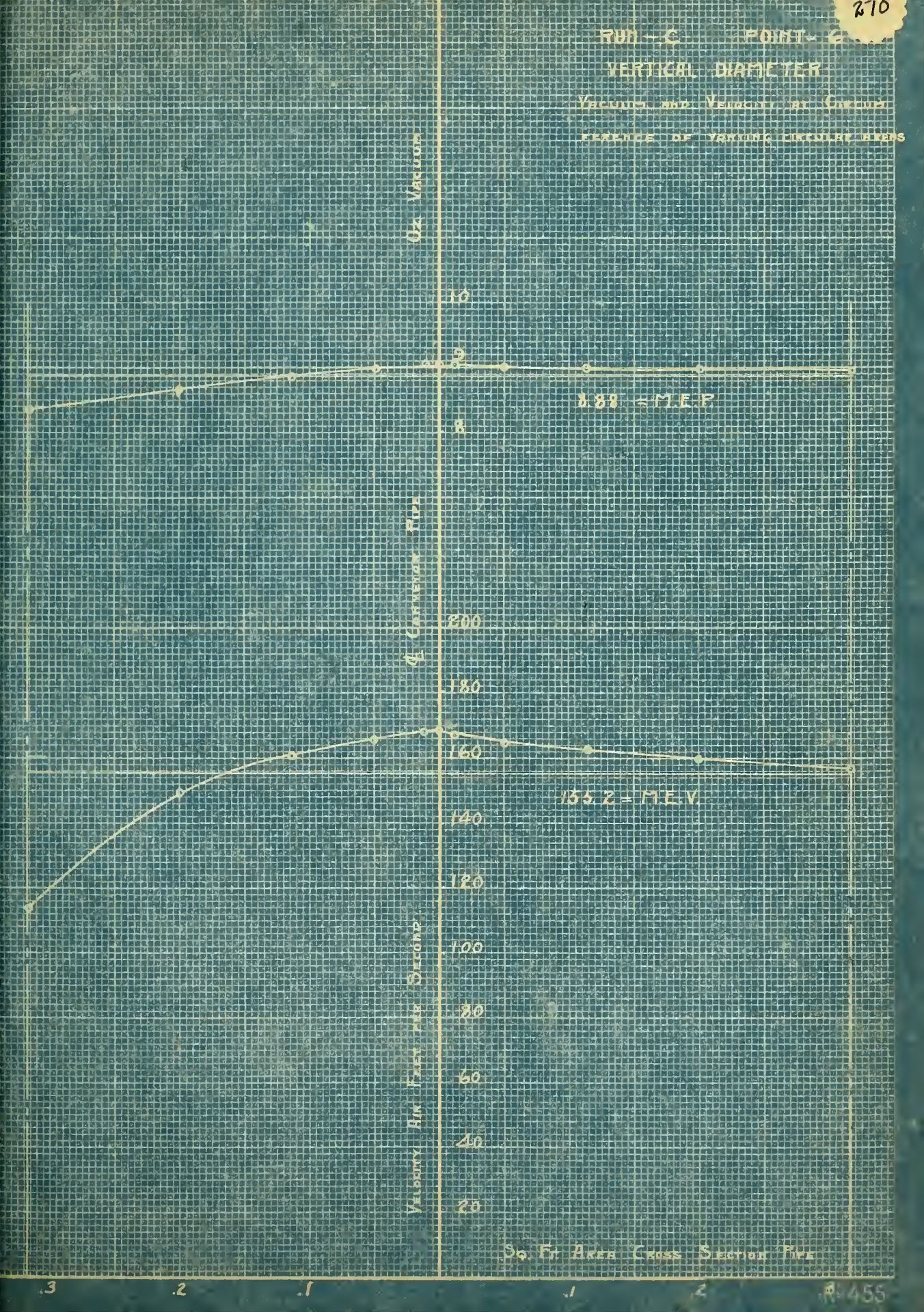
PITOT TUBE READINGS

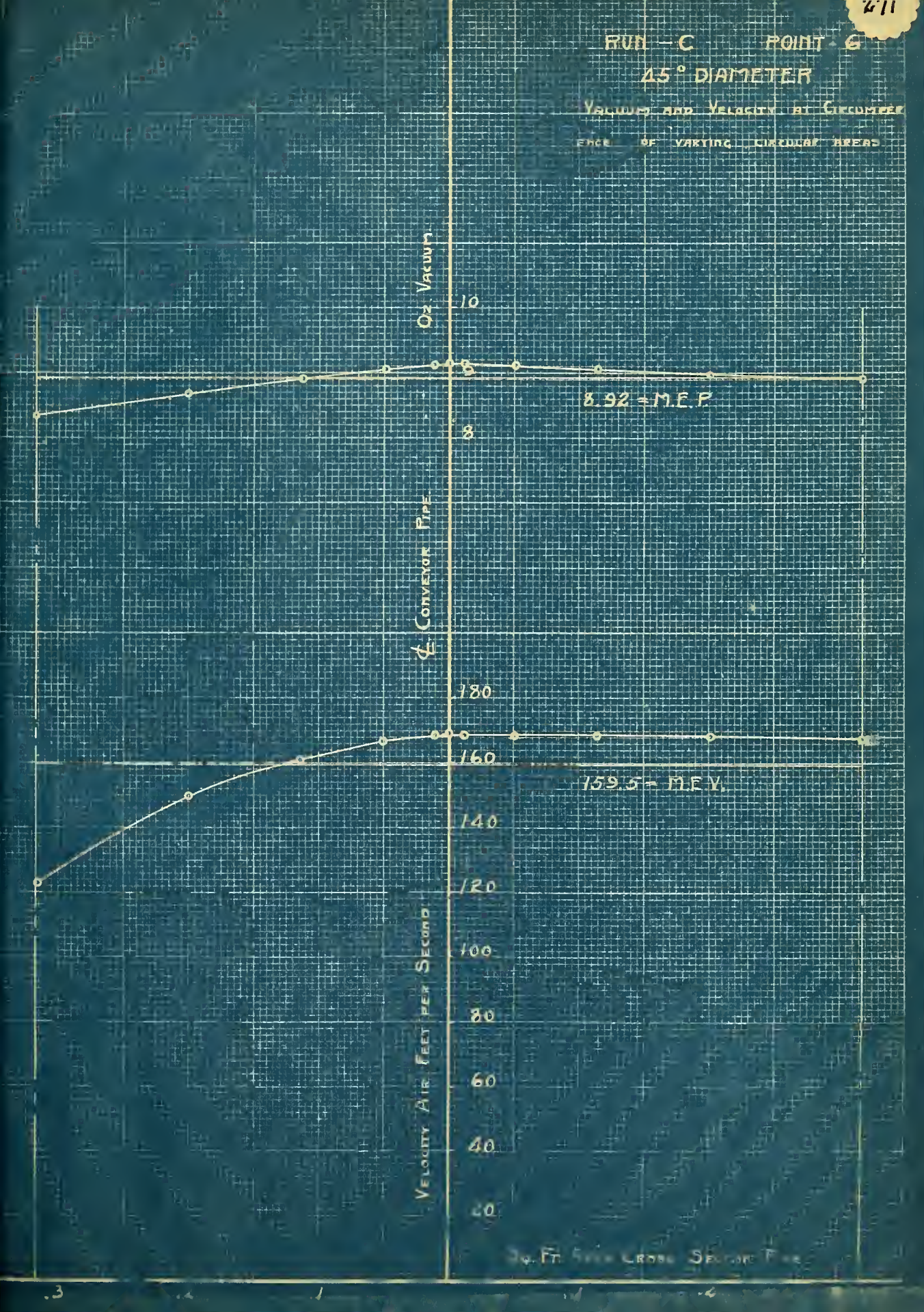
DIFFERENTIAL MERCURY GAUGE

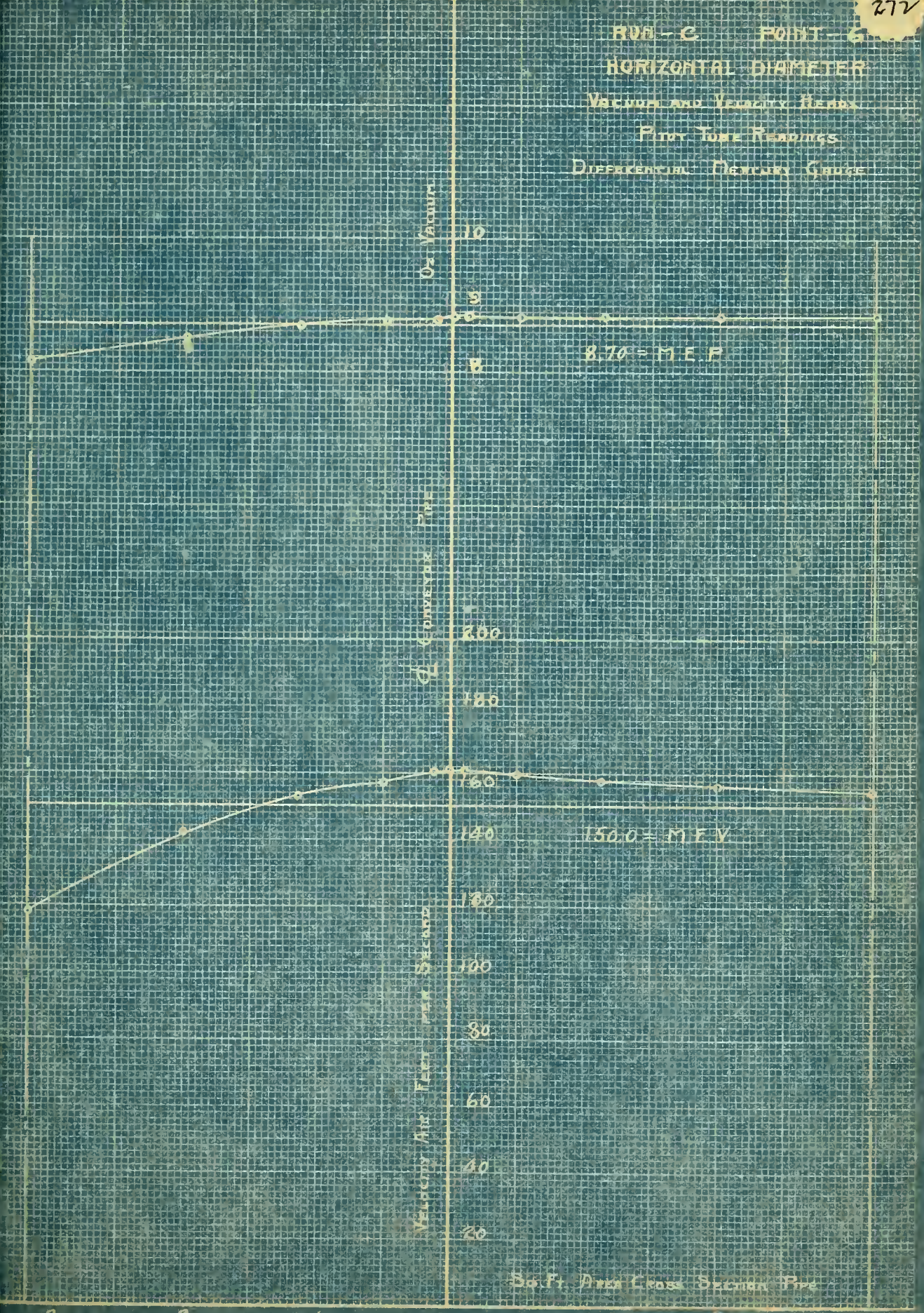


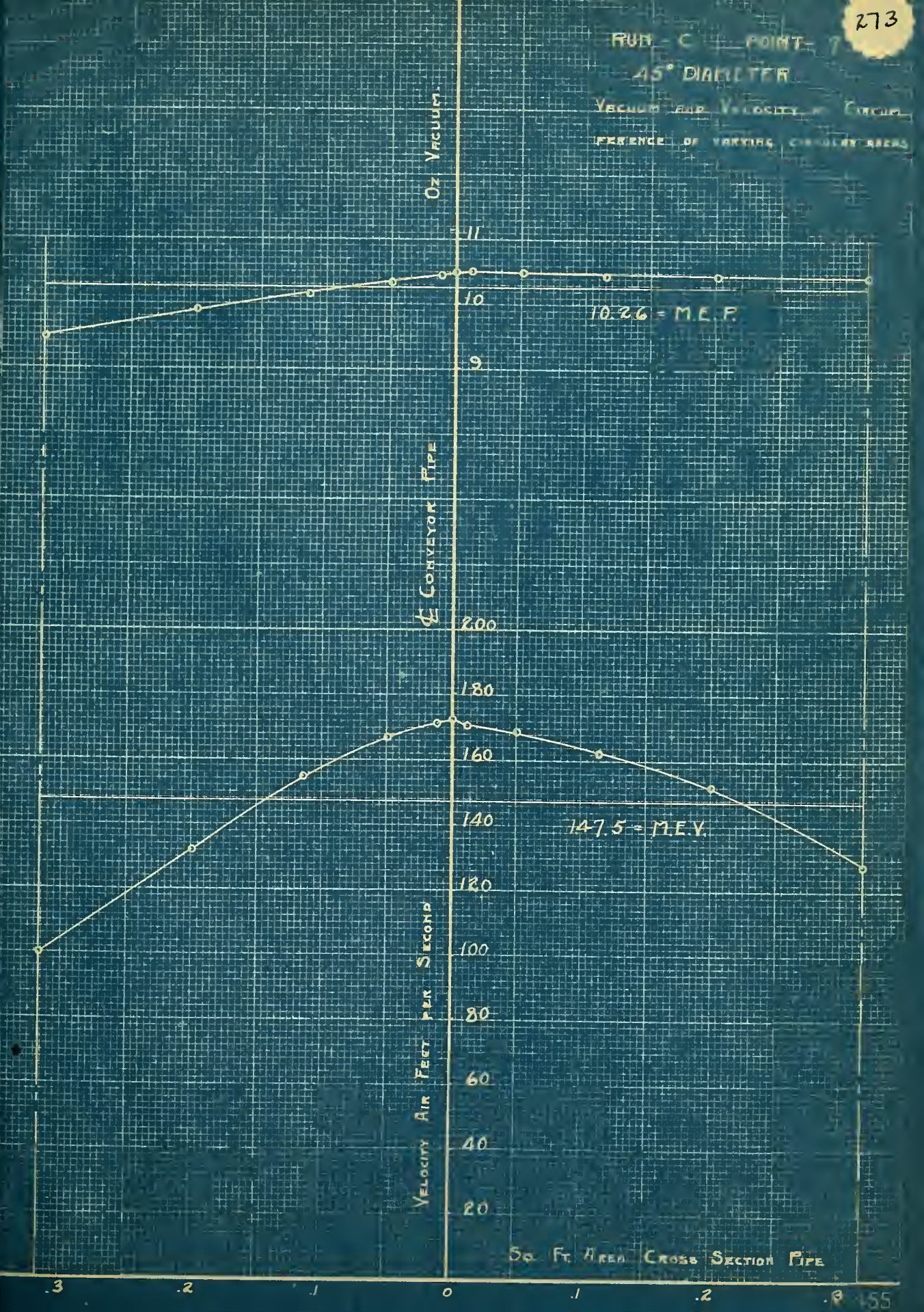
No 455

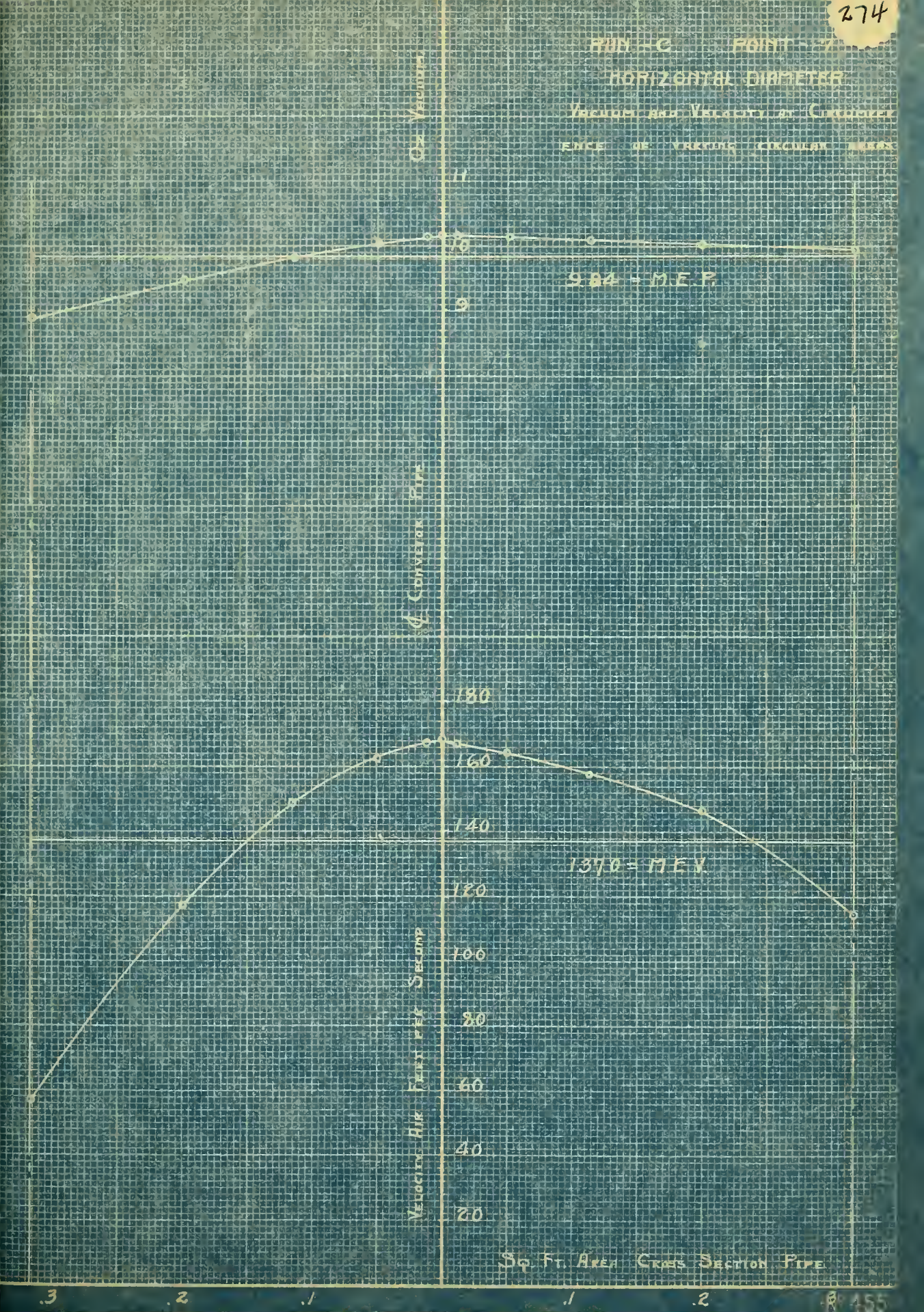

RUN - C POINT
45" DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS
OZ. VACUUM
9
8
7
8.30 = M.E.F.
℄ CONDITION AIR
200
180
160
140
140.08 = M.E.V.
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
.0
.1
.2
.3
N 455

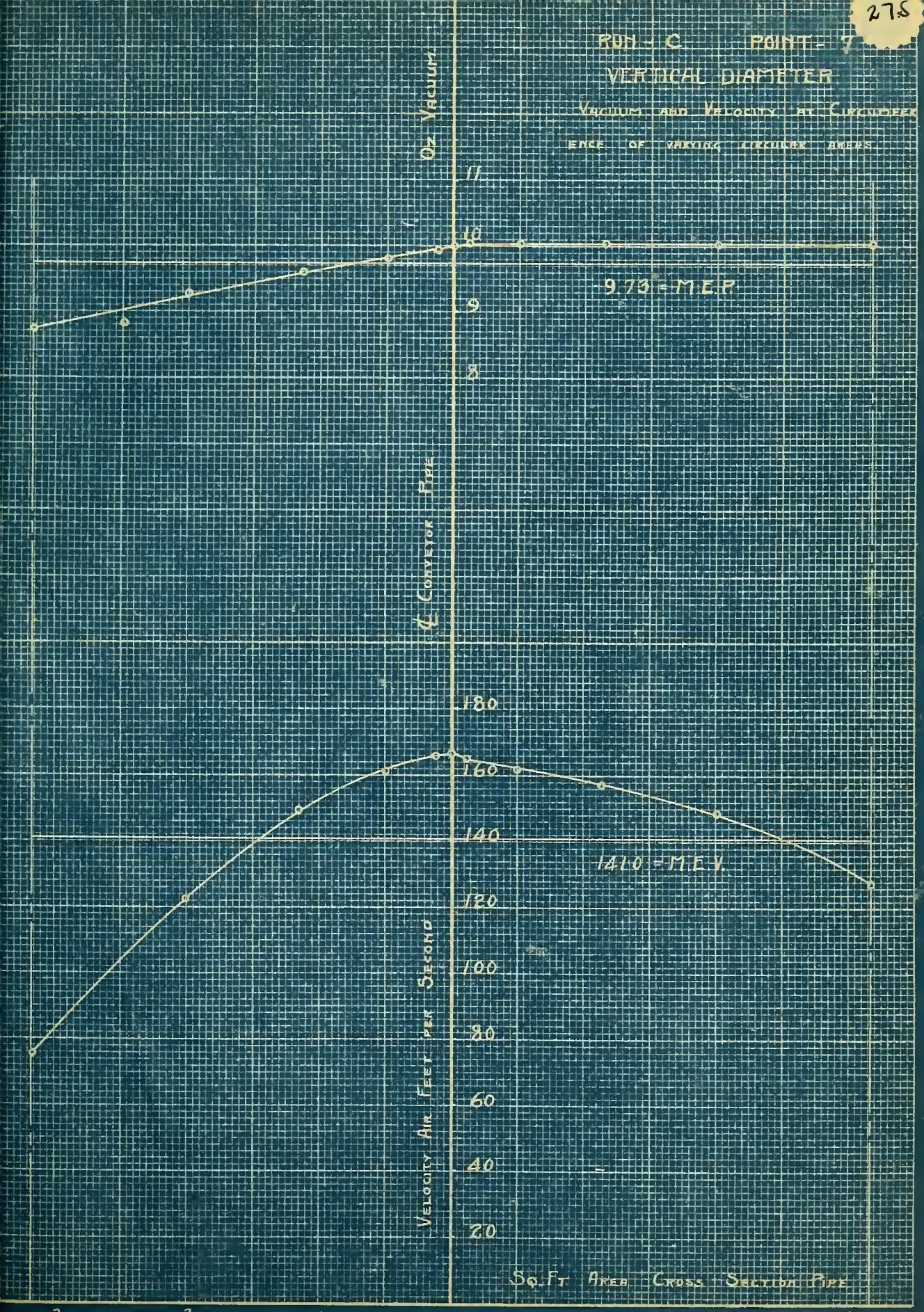

RUN - C
POINT - G
VERTICAL DIAMETER
Vacuum and Velocity at Convergence of varying circular areas
Qz Vacuum
10
9
8
.188 = M.E.P
Qz Convergence Pipe
200
180
160
140
120
100
80
60
40
20
.165 2 = M.E.V
Velocity Air Feet per Second
Sq. Ft. Area Cross Section Pipe
.3
.2
.1
.1
.2
.3

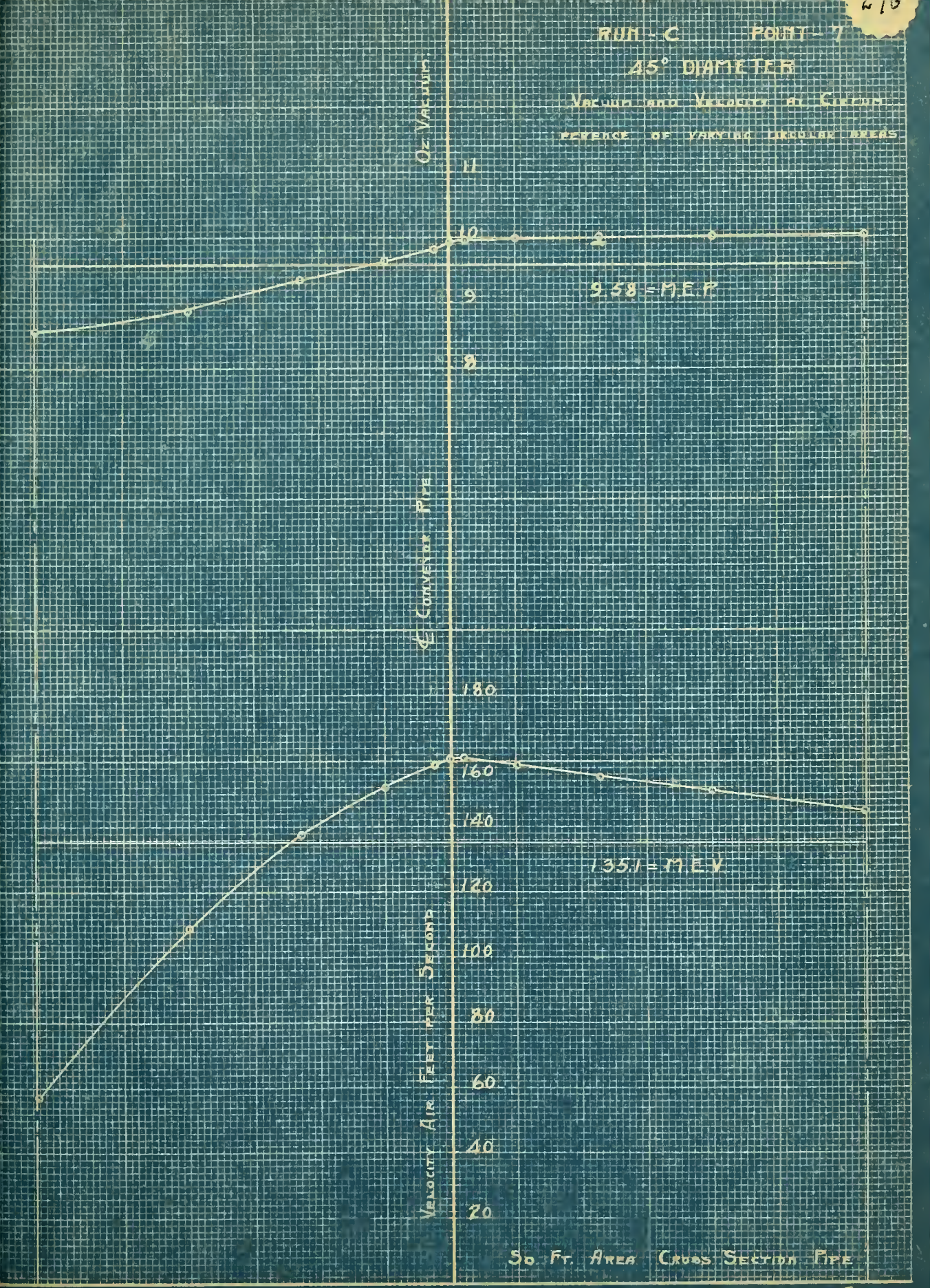

RUN - C POINT - 6
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS
OZ. VACUUM
10
8
8.92 = M.E.P
℄ CONVEYOR PIPE
180
160
159.5 = M.E.V.
140
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. CROSS SECTION PIPE
.3
.2
.1
.1
.2

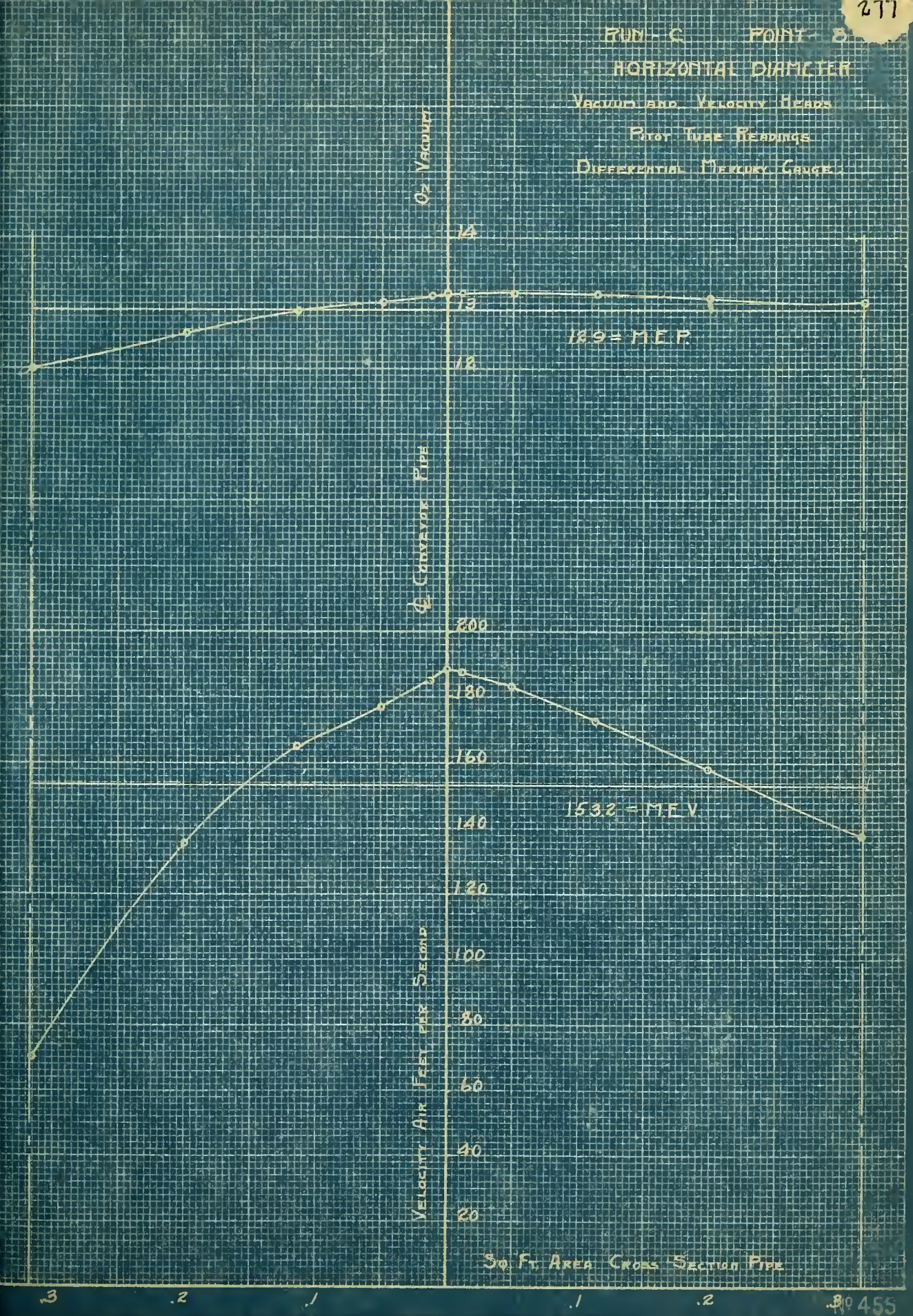

RUN - G POINT - 6
HORIZONTAL DIAMETER
VACUUM AND VELOCITY HEADS
PITOT TUBE READINGS
DIFFERENTIAL MERCURY GAUGE
Or Vacuum
110
3
8
8.70 = M.E.P
Cd Coefficient of Flow
200
180
160
140
150.0 = M.E.V
120
100
80
60
40
20
Velocity of Air Flow per Second
Sq. Ft. Area Cross Section Pipe
.3
.2
.1
.1
.2
.3


RUN - C POINT - 7
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS
OZ VACUUM
11
10
9
10.26 = M.E.P.
℄ CONVEYOR PIPE
200
180
160
140
147.5 = M.E.V.
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3

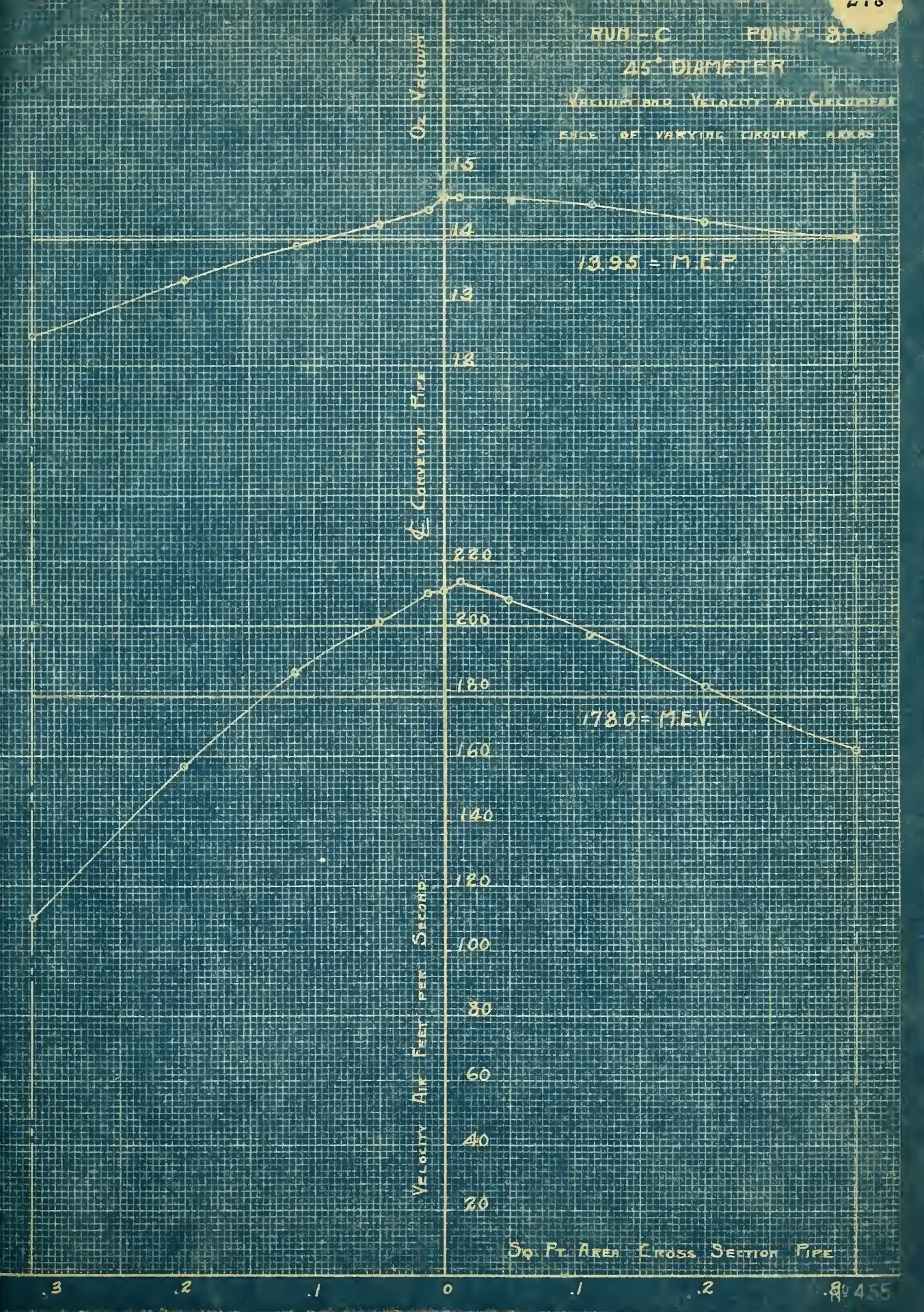

RUN - G
POINT - 27
HORIZONTAL DIAMETER
Velocity and Velocity of Circulation
Vacuum
Velocity of Converter Fan
Velocity Air Feet per Second
11
10
9
180
160
140
120
100
80
60
40
20
984 = M.E.P.
1370 = M.E.V.
Sq. Ft. Area Cross Section Pipe
.3
.2
.1
.1
.2

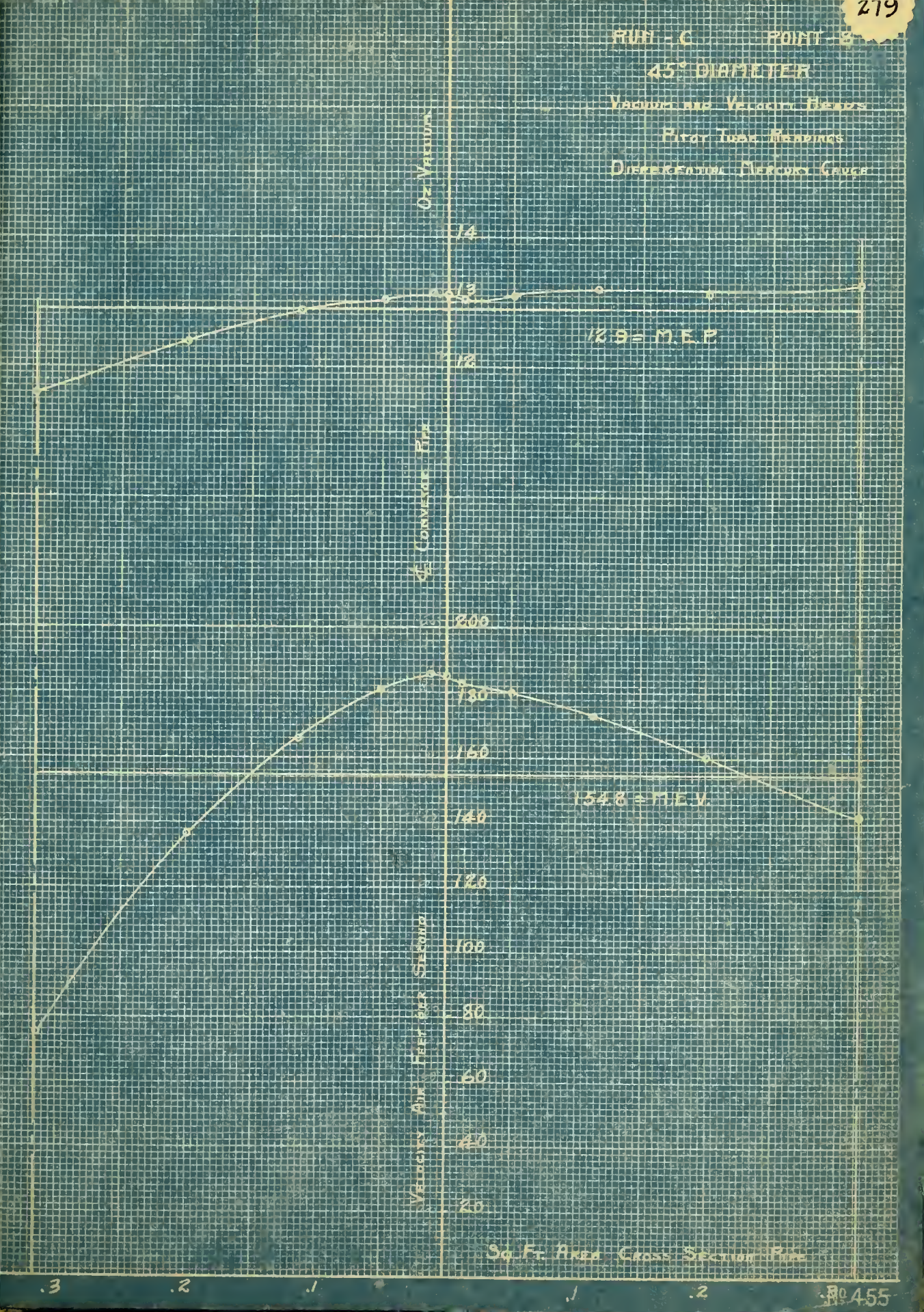

RUN = C
POINT = 7
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARIOUS CIRCULAR AREAS
OZ VACUUM
11
10
9
8
9.73 = M.E.P.
℄ CONVERGENT PIPE
180
160
140
120
100
80
60
40
20
1410 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT AREA CROSS SECTION PIPE
.3
.2
.1
.1
.2
No 455

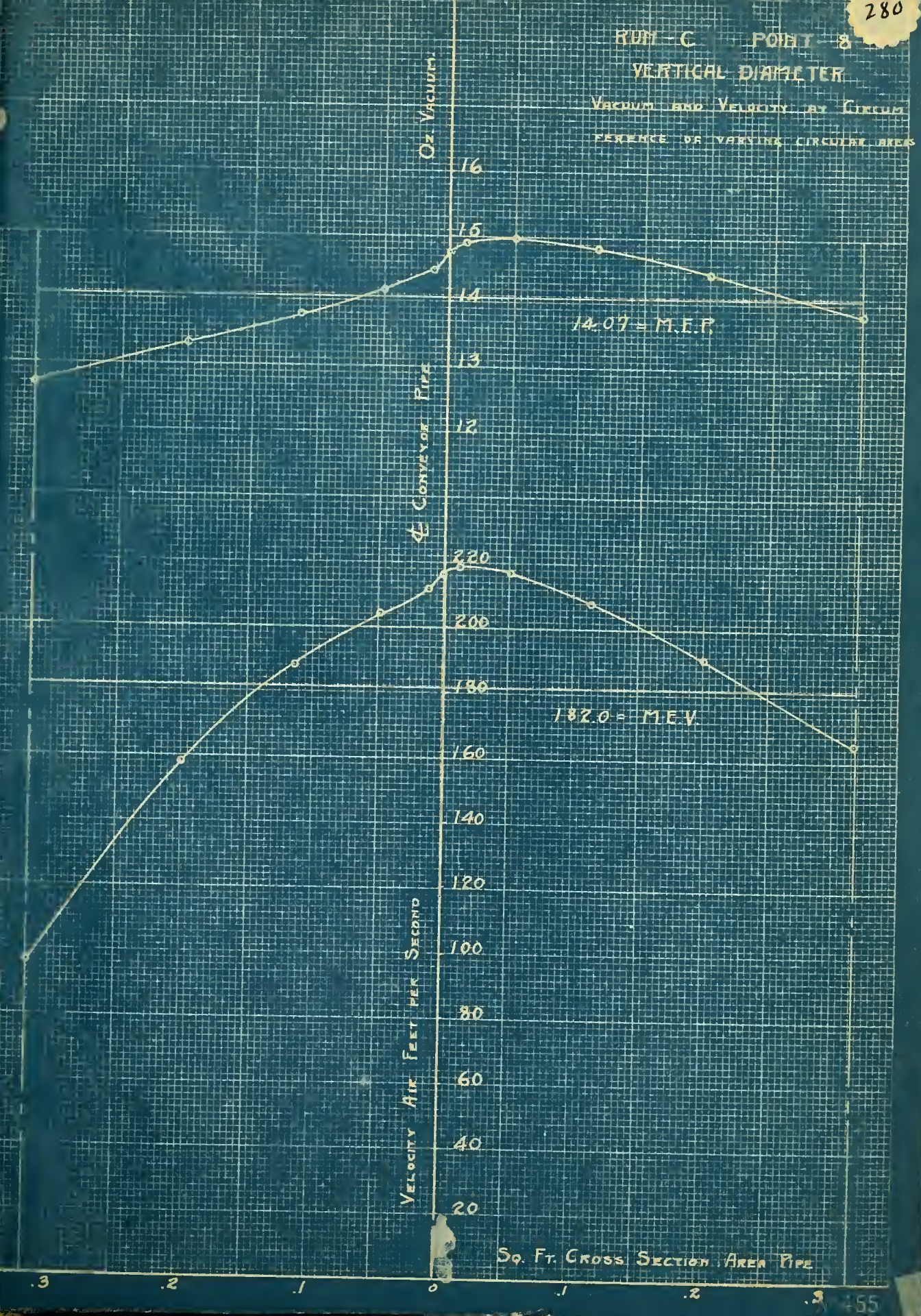

RUN - C
POINT - 7
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS
OZ. VACUUM
11
10
9
8
9.58 = M.E.P
℄ CONVERGE PIPE
180
160
140
120
100
80
60
40
20
135.1 = M.E.V
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
.1
.2
.3
№ 455


Run - C
Point - 8
Horizontal Diameter
Vacuum and Velocity Heads
Pitot Tube Readings
Differential Mercury Gauge
Q, Vacuum
14
13
12
18.9 = M.E.P.
Q, Cubic Feet Per Second
200
180
160
140
120
100
80
60
40
20
153.2 = M.E.V.
Velocity Air Feet per Second
30 Sq. Ft. Area Cross Section Pipe
.3
.2
.1
.1
.2
.3

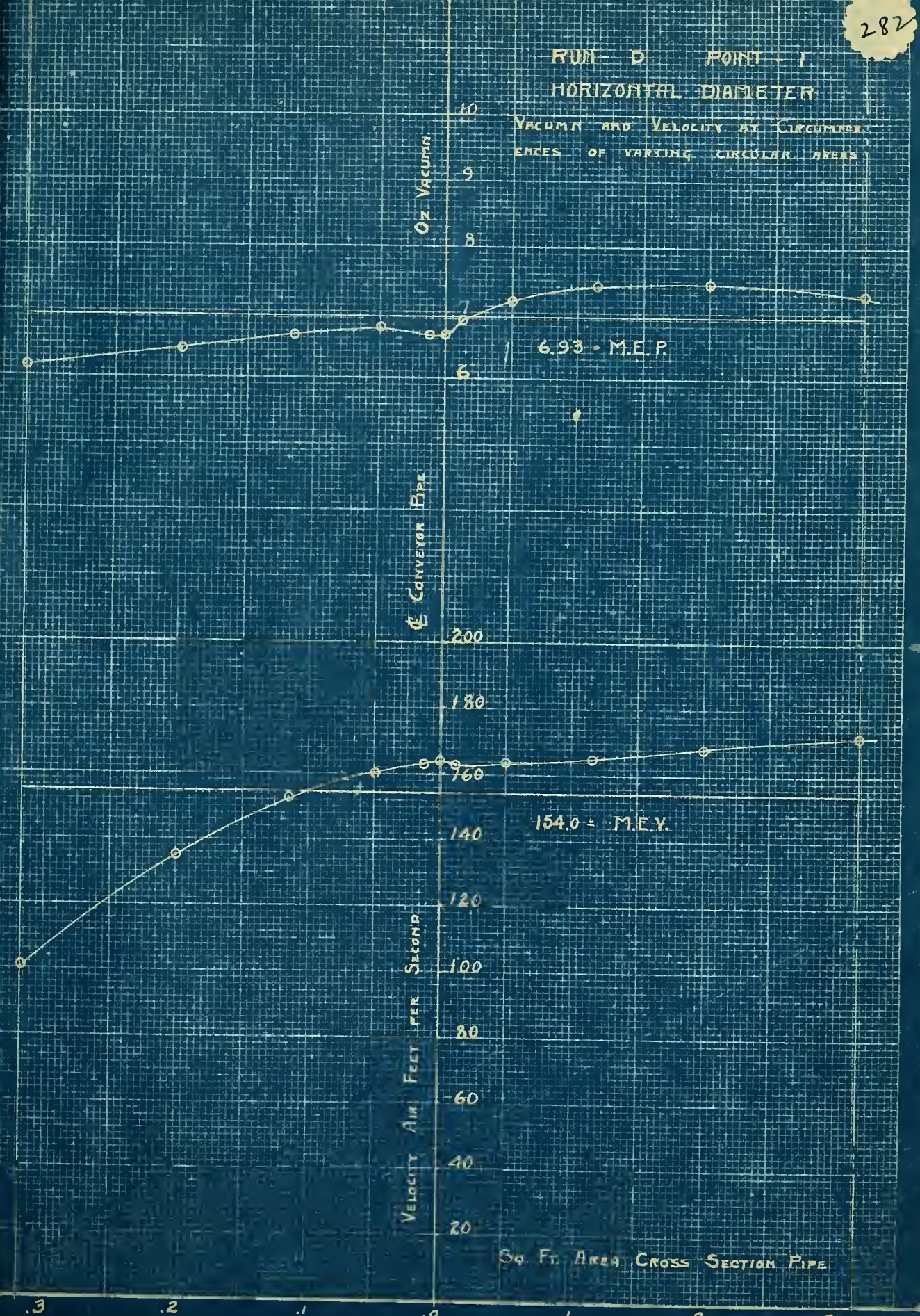
No 455

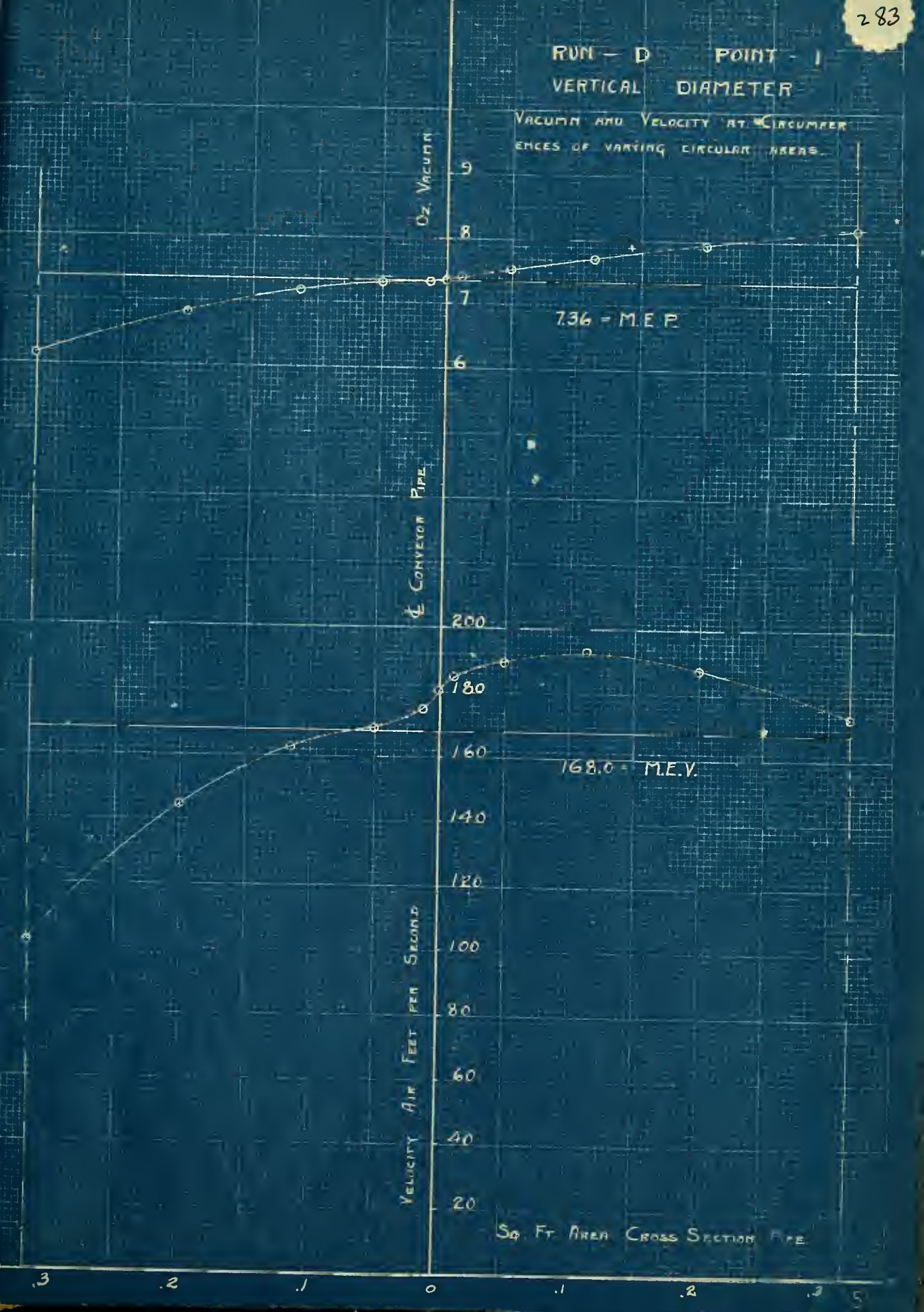

RUN - C
POINT - 8
45" DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE
EDGE OF VARYING CIRCULAR AREAS
OZ VACUUM
15
14
13
12
13.95 = M.E.P.
℄ CONVECTOR FLUE
220
200
180
178.0 = M.E.V.
160
140
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3


RUN - C POINT - 8
45" DIAMETER
Vacuum and Velocity Heads
Pitot Tube Readings
Differential Mercury Gauge
Oz. Vacuum
14
13
12
12.9 = M.E.P.
Oz. Convergent Pipe
200
180
160
140
120
100
80
60
40
20
15.28 = M.E.V.
Velocity of Air Feet per Second
Sq. Ft. Area Cross Section Pipe
.3
.2
.1
.1
.2
No. 455

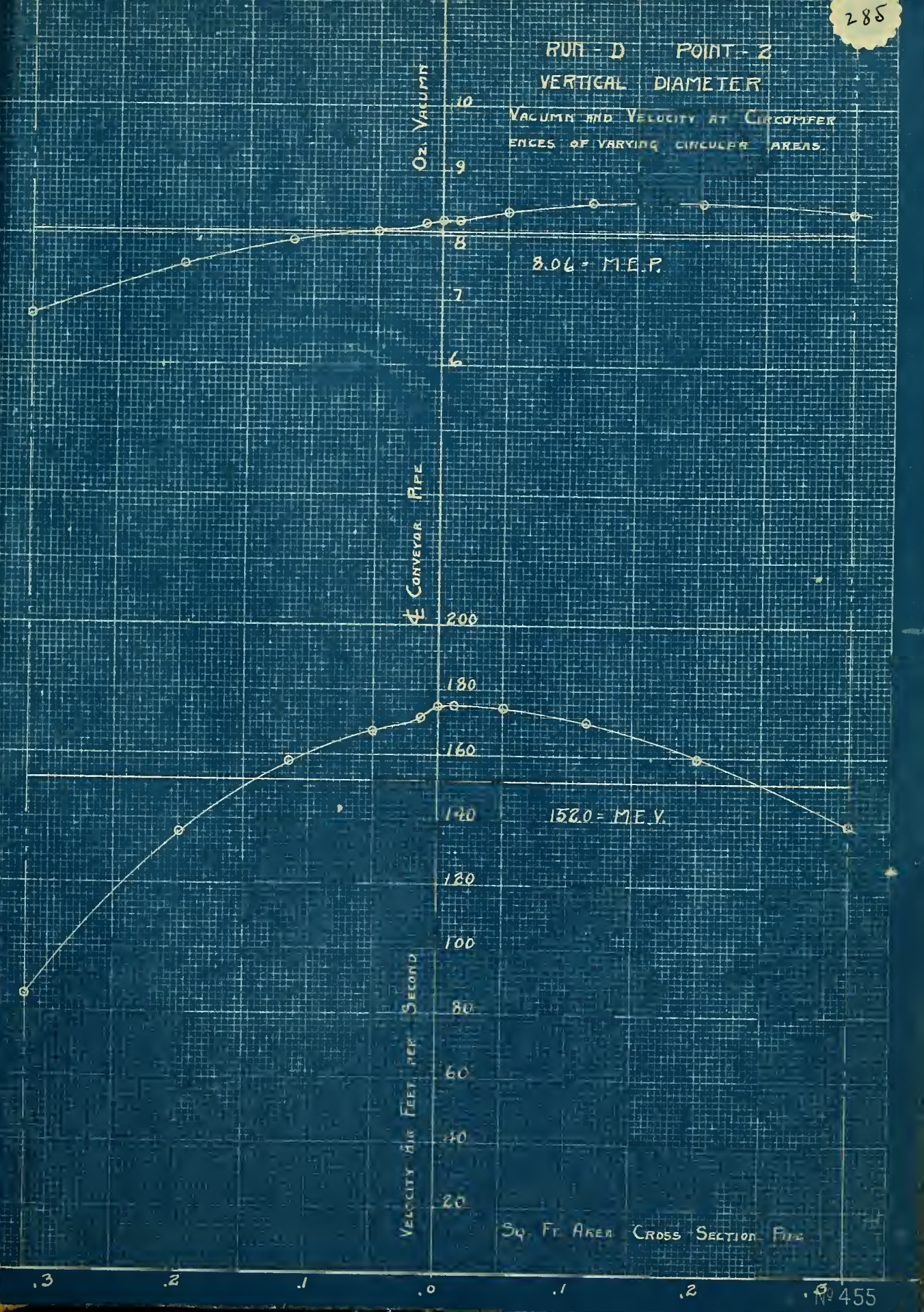

RUN - C POINT - 8
VERTICAL DIAMETER
VACUUM AND VELOCITY BY CIRCUMFERENCE OF VARYING CIRCULAR AREA
OZ. VACUUM
16
15
14
14.07 = M.E.P.
13
12
℄ CONVEYOR PIPE
220
200
180
182.0 = M.E.V.
160
140
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. CROSS SECTION AREA PIPE
.3
.2
.1
0
.1
.2
.3

RUN - D POINT - 1
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS
OZ. VACUUM
9
8
7
6
5
6.9 = MEP
℄ CONVEYOR PIPE
200
180
160
140
120
100
80
60
40
20
152.0 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
.1
.2
.3

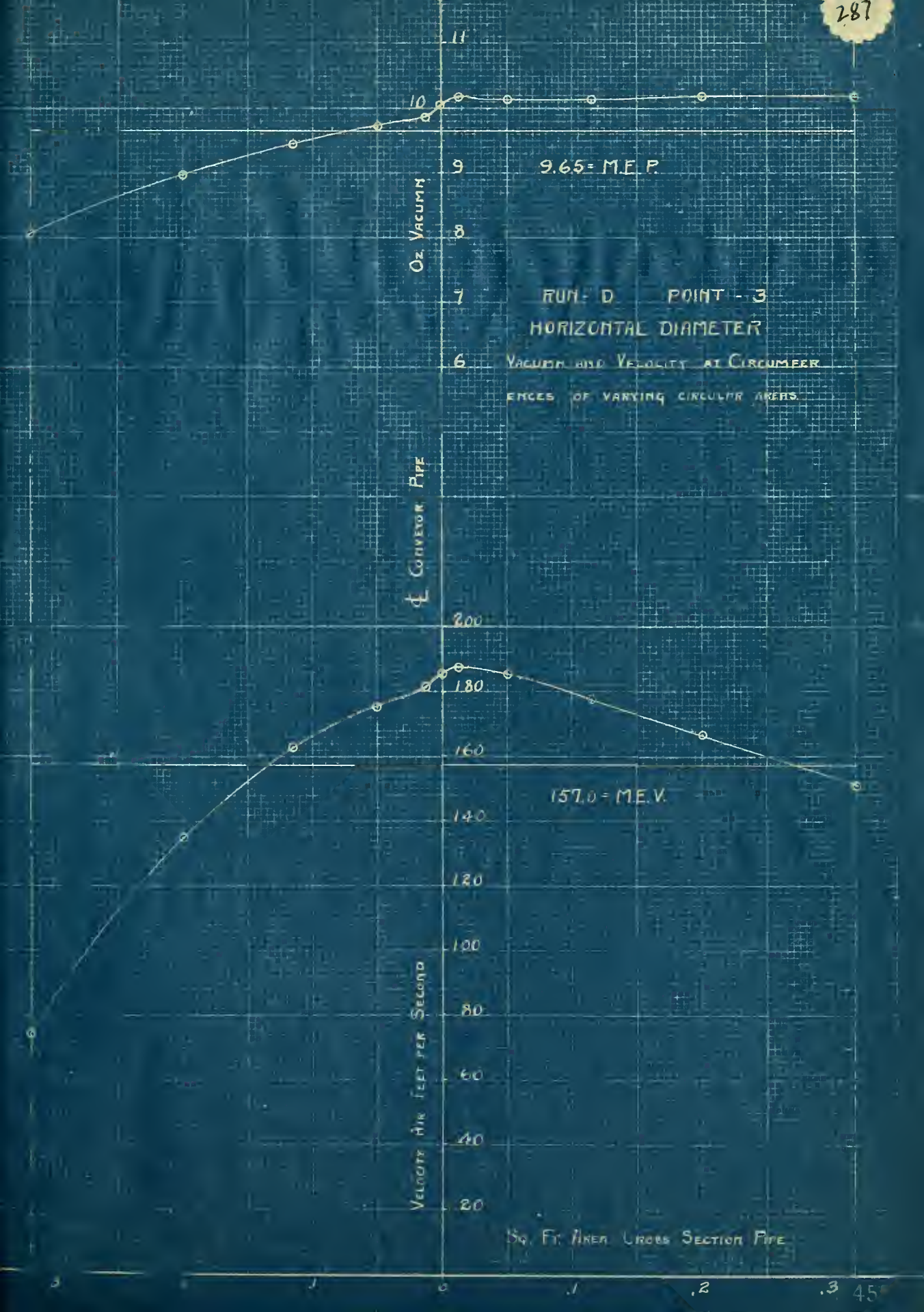

RUN - D POINT - I
HORIZONTAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS
OZ VACUUM
10
9
8
7
6
6.93 - M.E.P.
℄ CONVEYOR PIPE
200
180
160
140
120
100
80
60
40
20
154.0 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
.0
.1
.2
.3

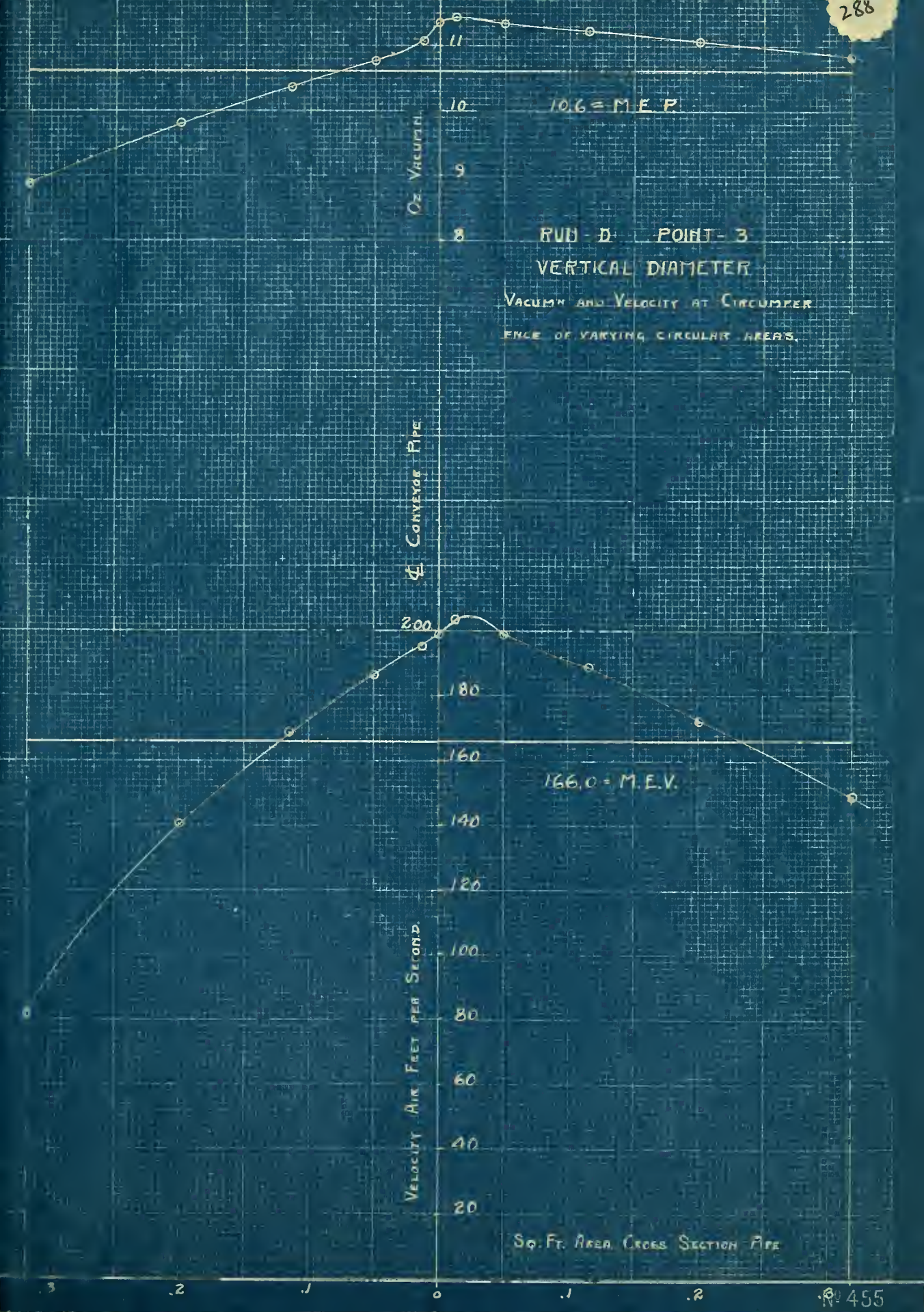

RUN — D POINT - 1
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS.
OZ. VACUUM
9
8
7
6
7.36 = M.E.P.
℄ CONVEYOR PIPE
200
180
160
168.0 = M.E.V.
140
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3

RUN - D POINT - 2
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS.
OZ. VACUUM.
10
9
8
7
6
7.96 = M.E.P.
℄ CONVEYOR PIPE
200
180
160
140
150.0 = M.E.V.
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3

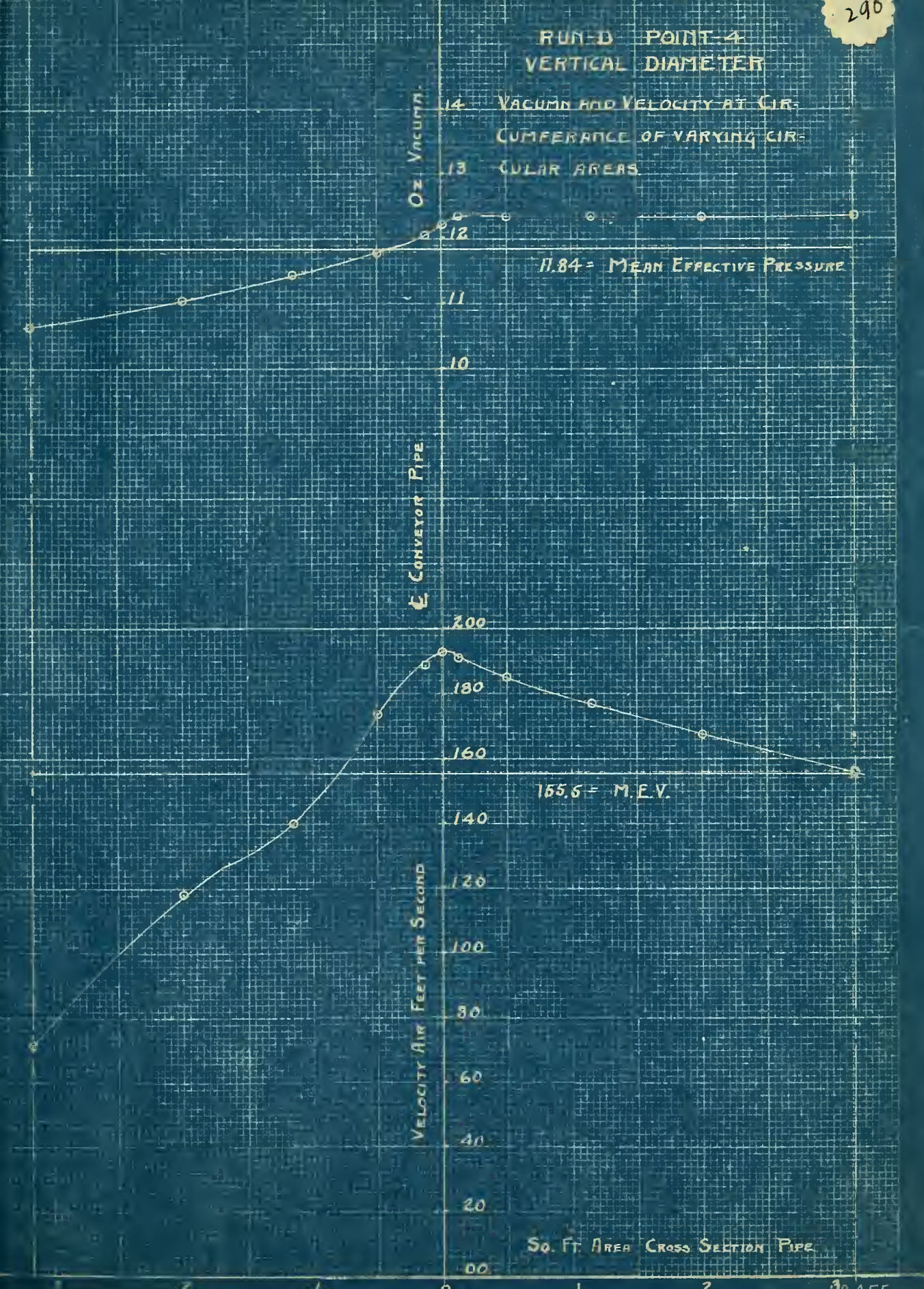

RUN - D POINT - 2
VERTICAL DIAMETER
VACUMN AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS.
Oz. VACUMN
10
9
8
7
6
8.06 = M.E.P.
℄ CONVEYOR PIPE
200
180
160
140
120
100
80
60
40
20
152.0 = M.E.V.
VELOCITY IN FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
.0
.1
.2
.3

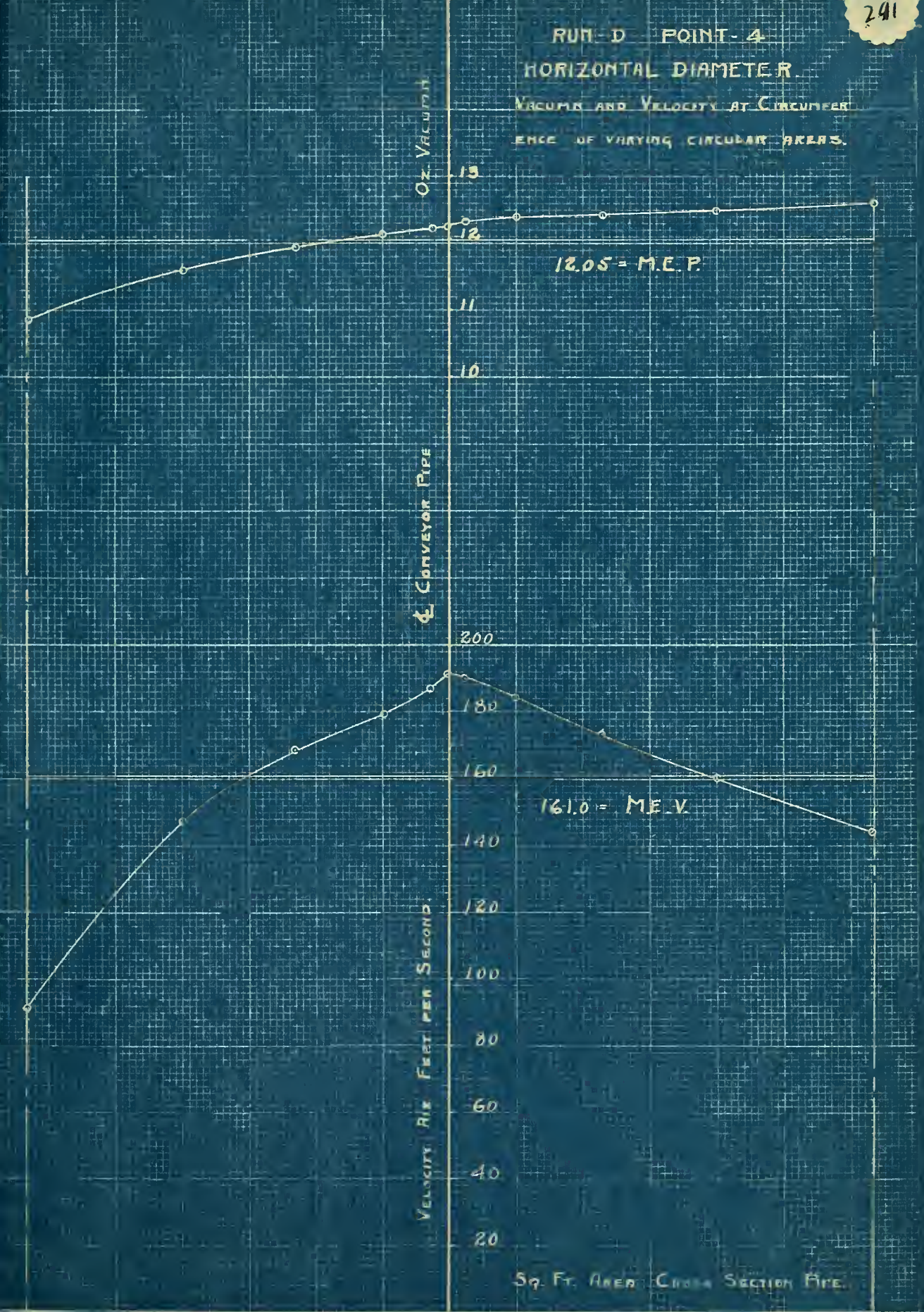
RUN - D POINT - 2
HORIZONTAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS.
OZ. VACUUM
10
9
8
7
6
8.03 = M.E.P.
H C WATER PIPE
200
180
160
140
120
100
80
60
40
20
154 = M.E.V.
VELOCITY IN FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3

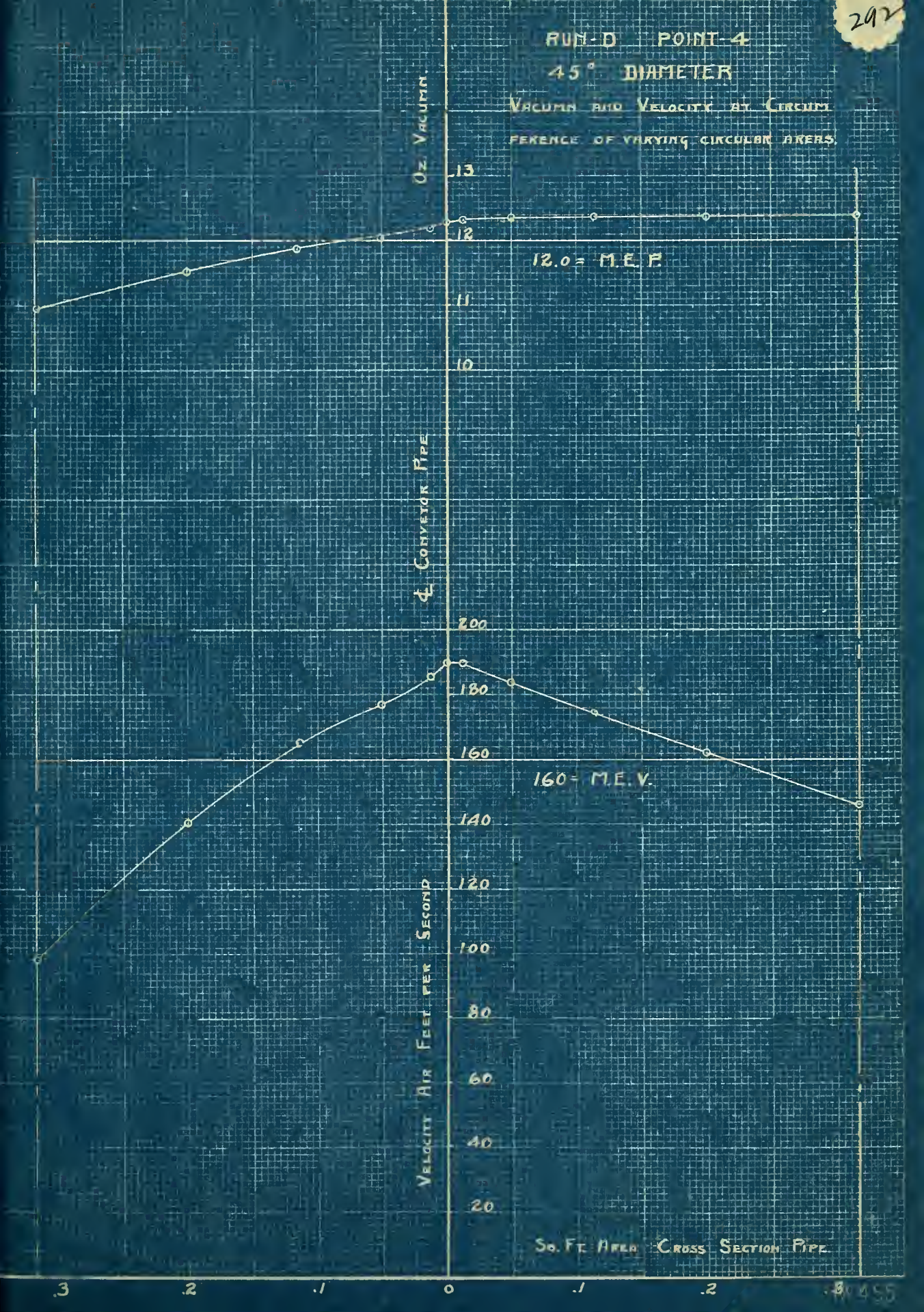

11
10
9
8
7
6
Oz. Vacuum
9.65 = M.E.P.
RUN: D POINT - 3
HORIZONTAL DIAMETER
Vacuum and Velocity at Circumferences of varying circular areas
℄ Conveyor Pipe
200
180
160
140
120
100
80
60
40
20
157.0 = M.E.V.
Velocity Air Feet per Second
Sq. Ft. Area Cross Section Pipe
.3
.2
.1
0
.1
.2
.3


10.6 = M.E.P.
Oz. Vacuum
11
10
9
8
RUN - D POINT - 3
VERTICAL DIAMETER
Vacuum and Velocity at Circumference of varying circular areas.
Conveyor Pipe
200
180
160
166.0 = M.E.V.
140
120
100
80
60
40
20
Velocity Air Feet per Second.
Sq. Ft. Area Cross Section Pipe
.3
.2
.1
0
.1
.2
.3

RUN D POINT 3
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS
OZ. VACUUM
10
9
8
9.15 = M.E.P.
℄ CONVEYOR PIPE
200
180
160
140
120
100
80
60
40
20
148.4 = M.E.V.
VELOCITY IN FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
.1
.2
.3


RUN-D POINT-4
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIR-
CUMFERANCE OF VARYING CIR-
CULAR AREAS
OZ. VACUUM
14
13
12
11.84 = MEAN EFFECTIVE PRESSURE
11
10
℄ CONVEYOR PIPE
200
180
160
155.5 = M.E.V.
140
120
100
80
60
40
20
00
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.2
.1
0
.1
.2
.3

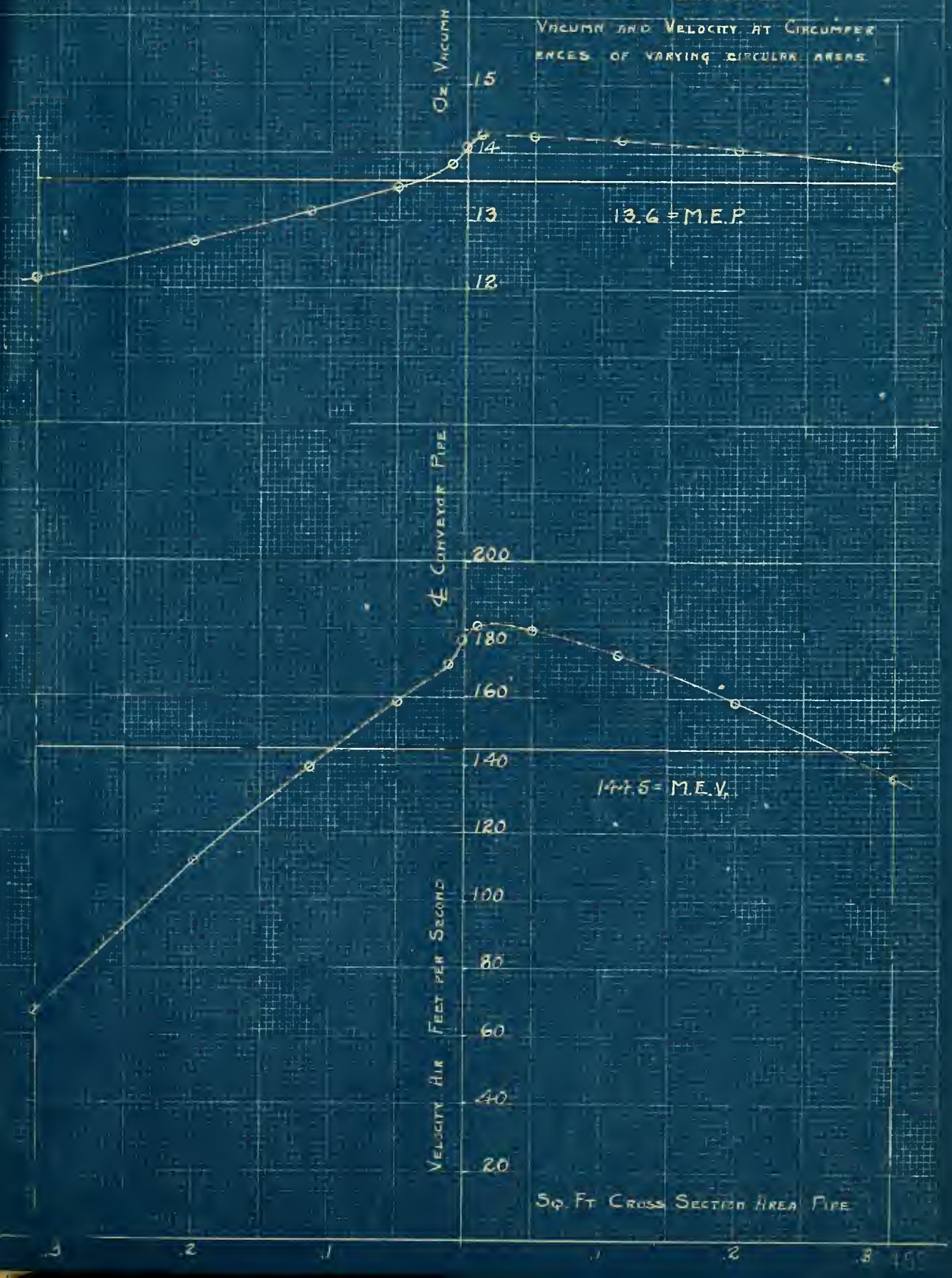

RUN D POINT 4
HORIZONTAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS.
OZ. VACUUM
13
12
11
10
12.05 = M.E.P.
℄ CONVEYOR PIPE
200
180
160
140
120
100
80
60
40
20
161.0 = M.E.V.
VELOCITY AIR FEET PER SECOND.
SQ. FT. AREA CROSS SECTION PIPE.
.3
.2
.1
0
.1
.2
.3


RUN-D POINT-4
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCE OF VARYING CIRCULAR AREAS.
OZ. VACUUM.
13
12
12.0 = M.E.P.
11
10
℄ CONVEYOR PIPE
200
180
160
160 = M.E.V.
140
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
0
.1
.2
.3

RUN - D POINT - 5

45° DIAMETER

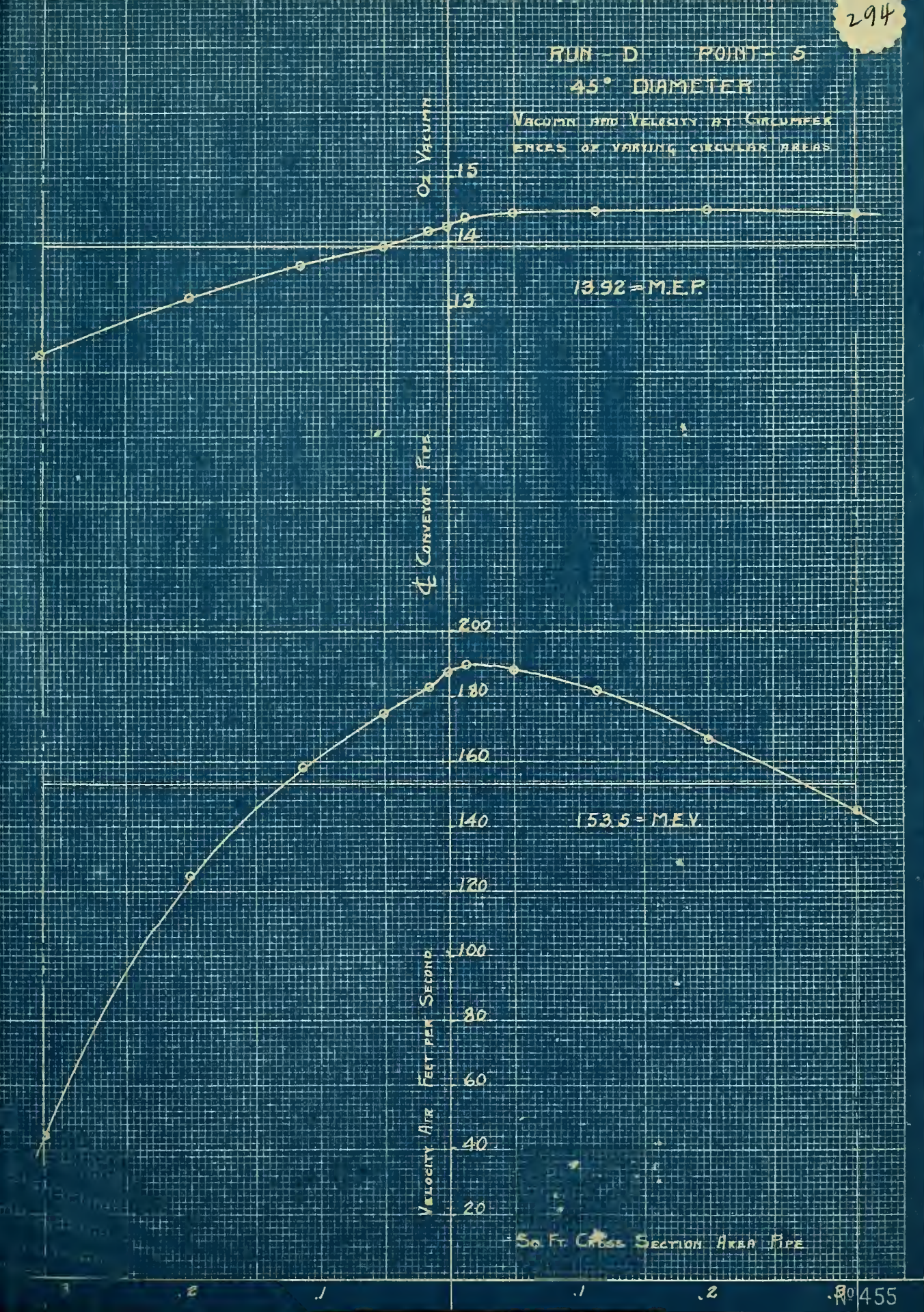
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS

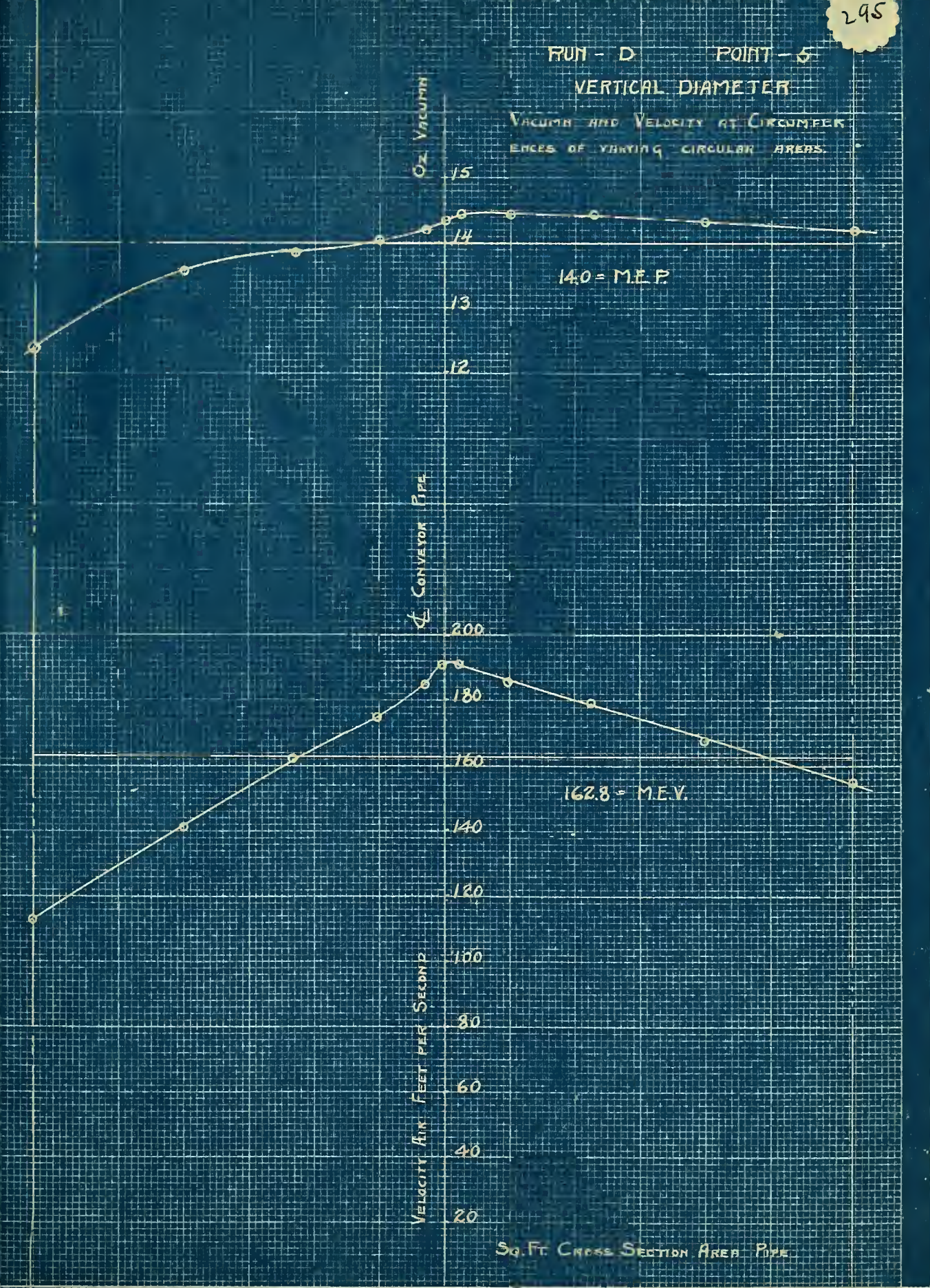


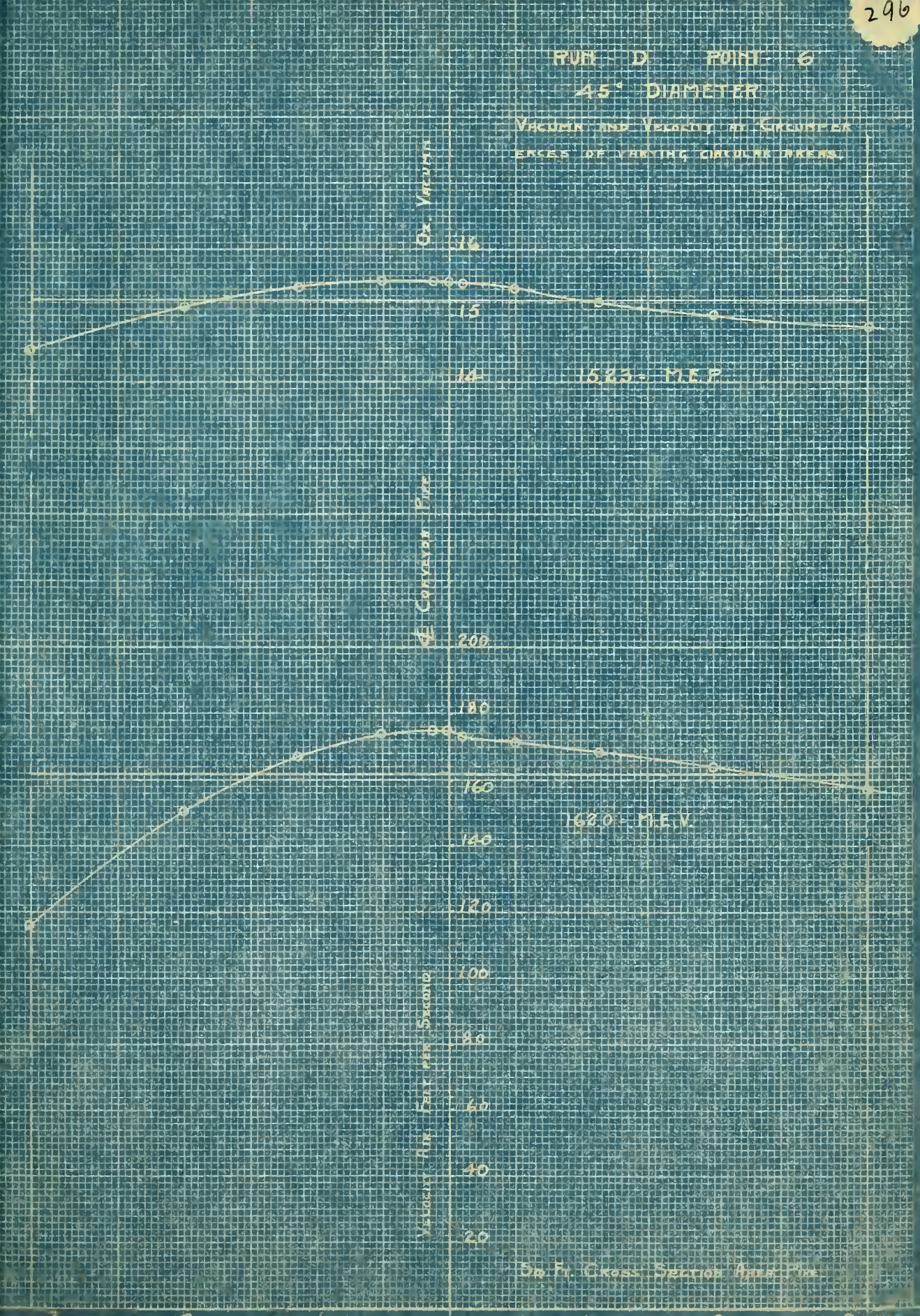
RUN - D POINT - 5

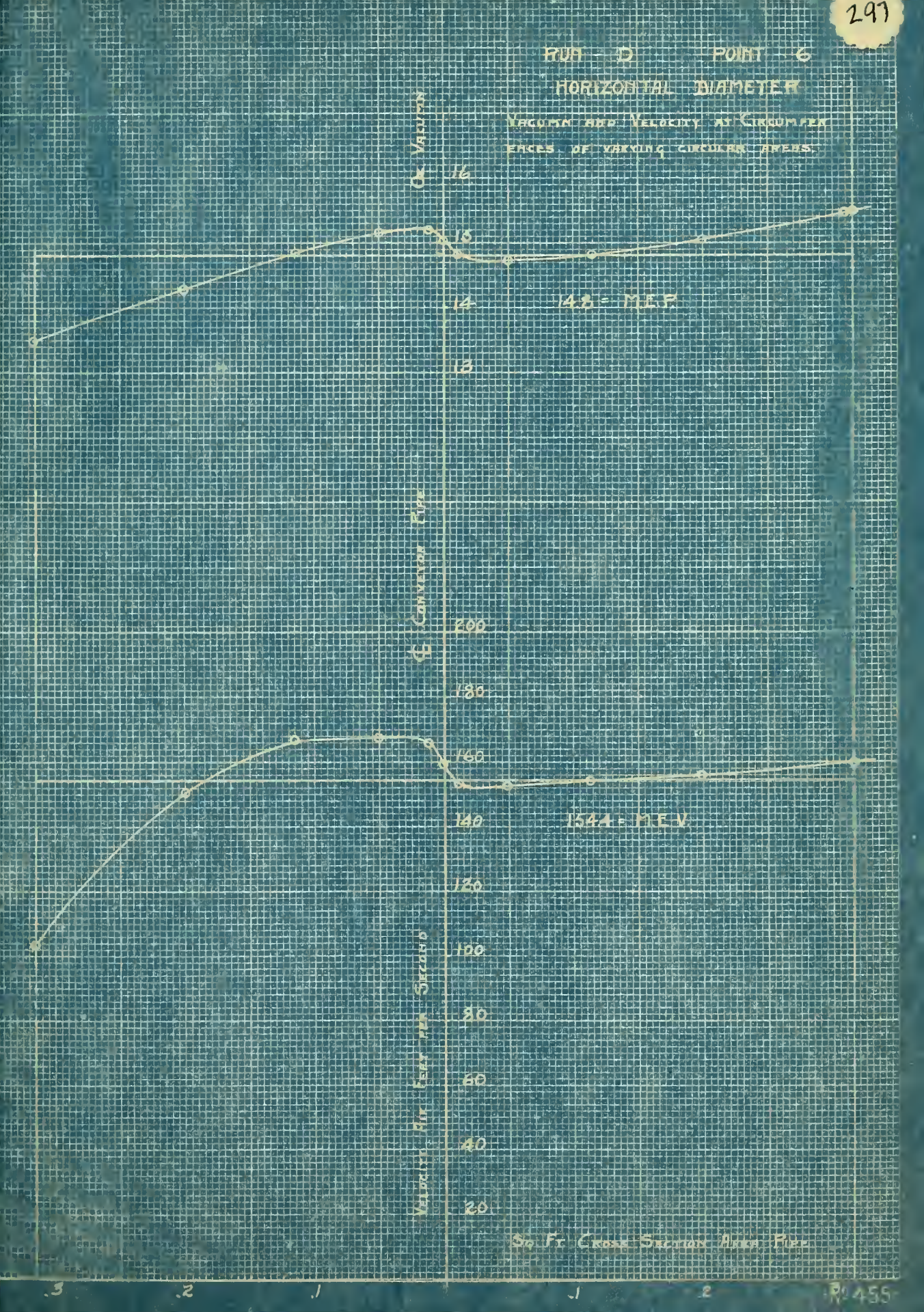
45° DIAMETER

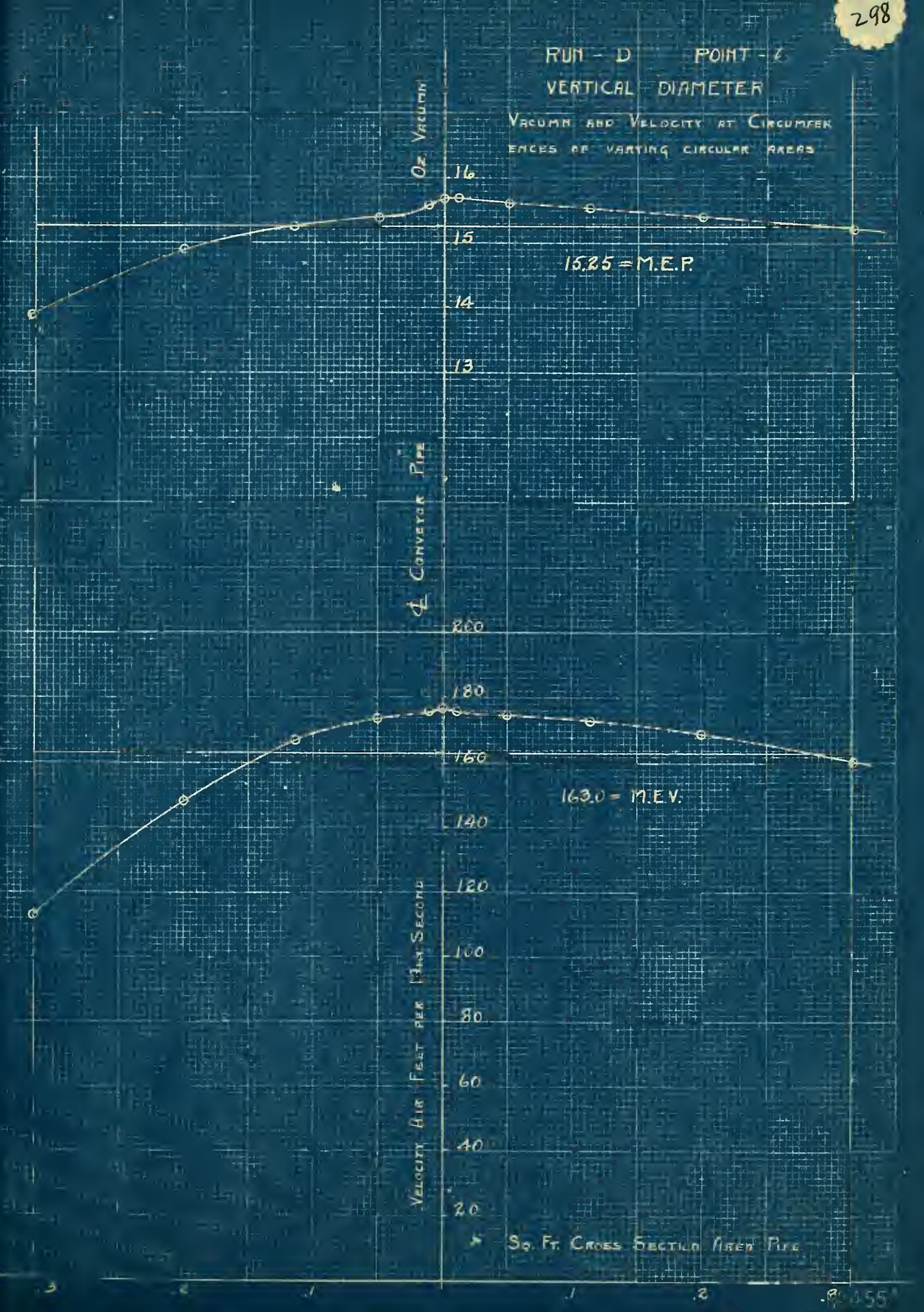
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS




RUN - D POINT - 5
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS.
OZ VACUUM
15
14
13
12
14.0 = M.E.P.
℄ CONVEYOR PIPE
200
180
160
140
120
100
80
60
40
20
162.8 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. CROSS SECTION AREA PIPE
.3
.2
.1
.1
.2
.3


RUN D POINT 6
45" DIAMETER
VACUUM AND VELOCITY OF SECONDARY
ENGINES OF VARYING CIRCULAR AREAS
Or. VACUUM
16
15
14
1623 = M.E.P.
Or. CONVERGENT PIPE
200
180
160
140
120
100
80
60
40
20
1620 = M.E.V.
VELOCITY AIR FEET PER SECOND
Sq. Ft. CROSS SECTION AREA PIPE
.3
.2
.1
.1
.2

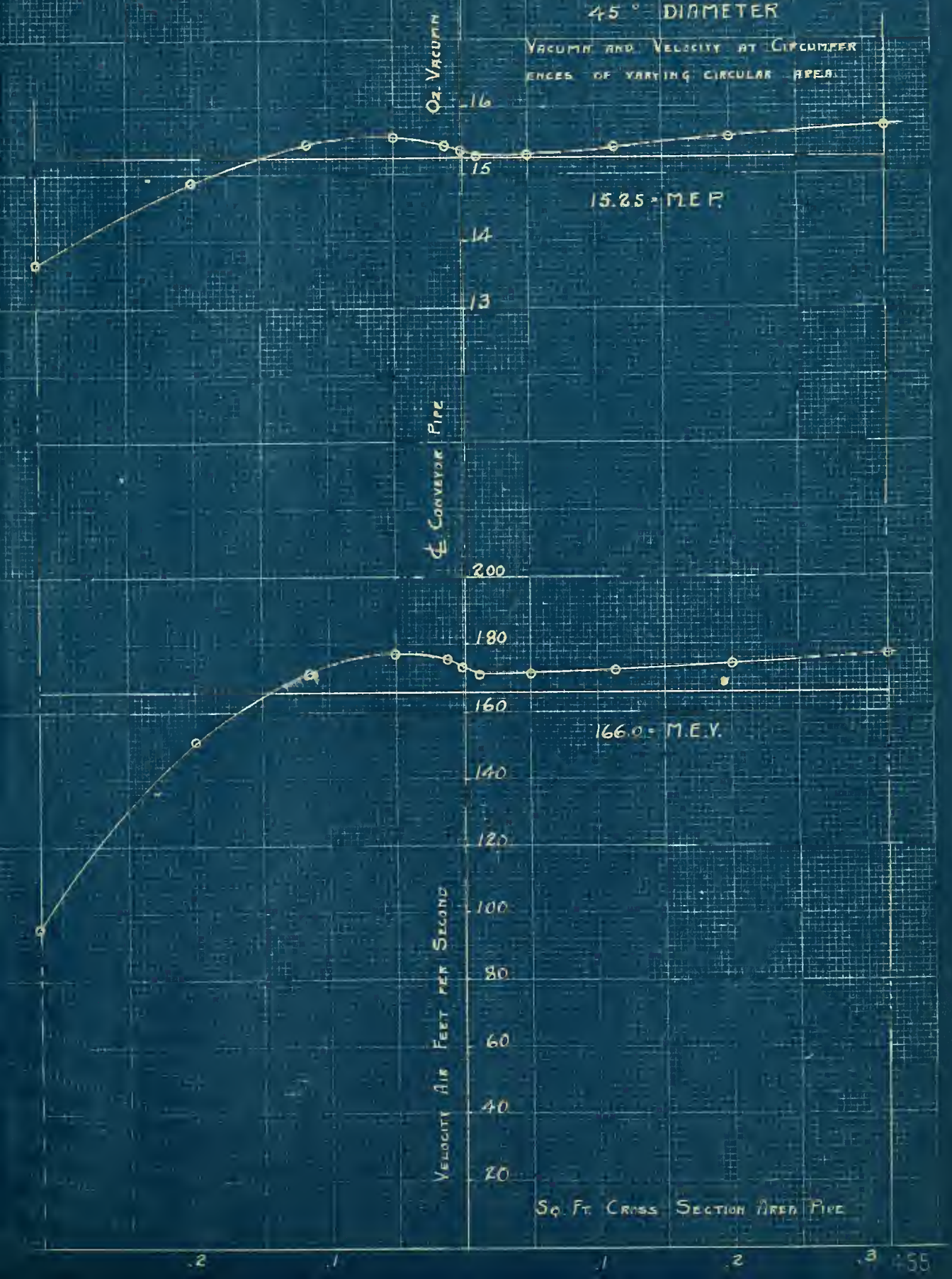

RUN - D POINT - 6
HORIZONTAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS.
Vacuum
16
15
14
13
142 = M.E.P.
Cubic Feet per Second
200
180
160
140
120
100
80
60
40
20
1544 = M.E.V.
Velocity Feet per Second
Sq. Ft. Cross Sectional Area Pipe
.3
.2
.1
.1
.2
R 455

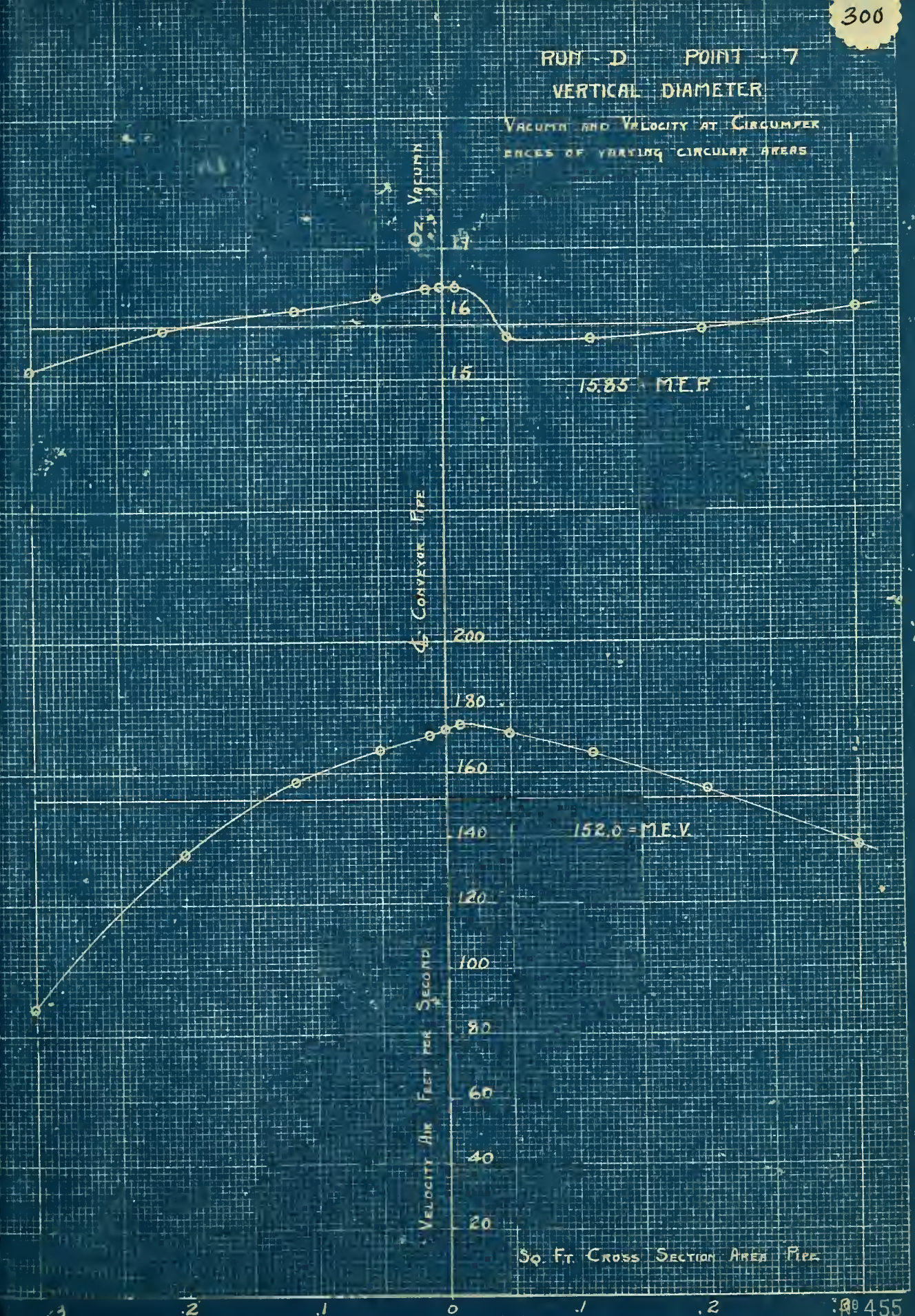

RUN - D POINT - L
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS
OZ VACUUM
16
15
14
13
15.25 = M.E.P.
℄ CONVEYOR PIPE
200
180
160
140
120
100
80
60
40
20
163.0 = M.E.V.
VELOCITY AIR FEET PER MIN SECOND
SQ. FT. CROSS SECTION AREA PIPE
.3
.2
.1
.1
.2
.3

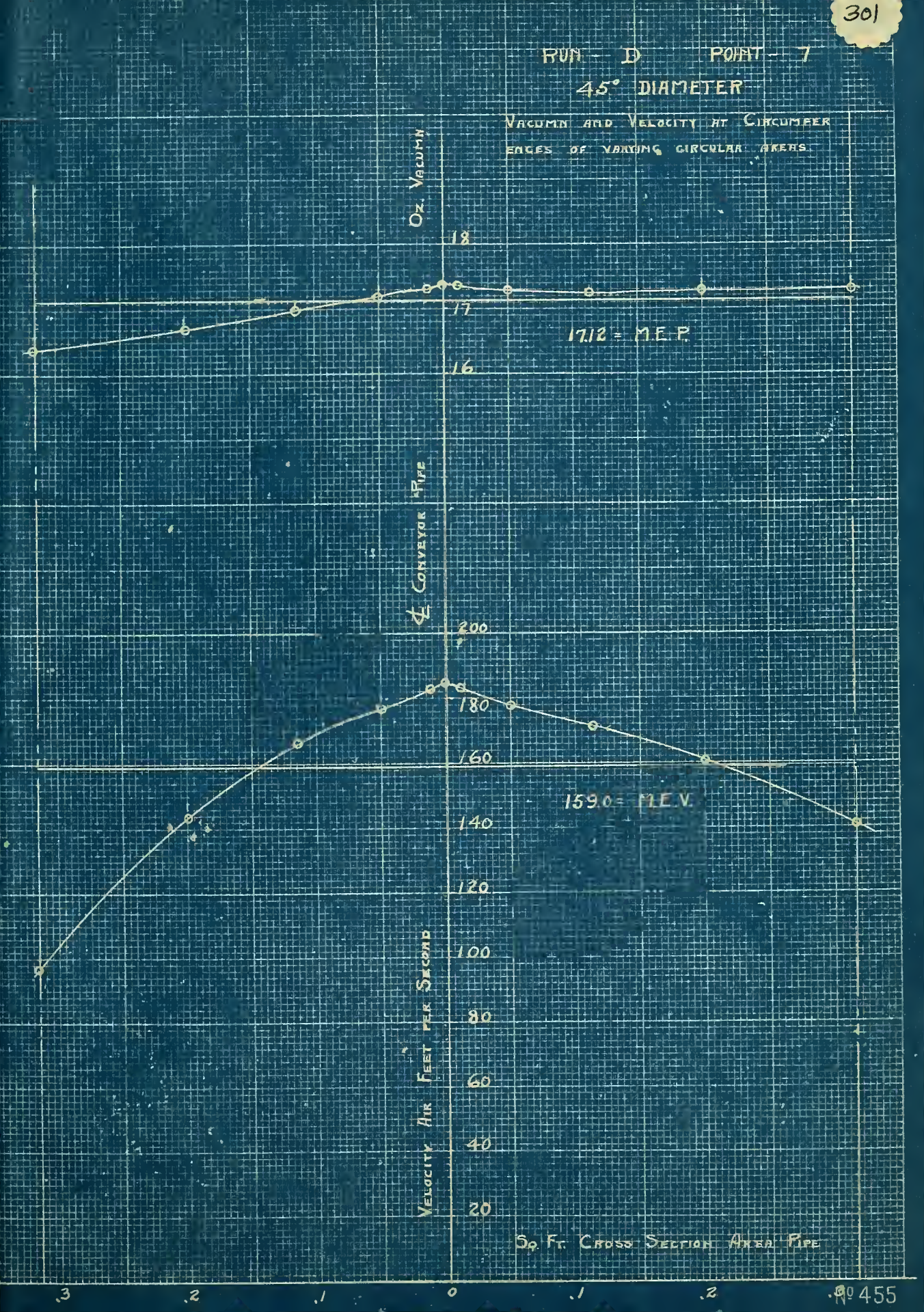
RUN - D POINT - 6

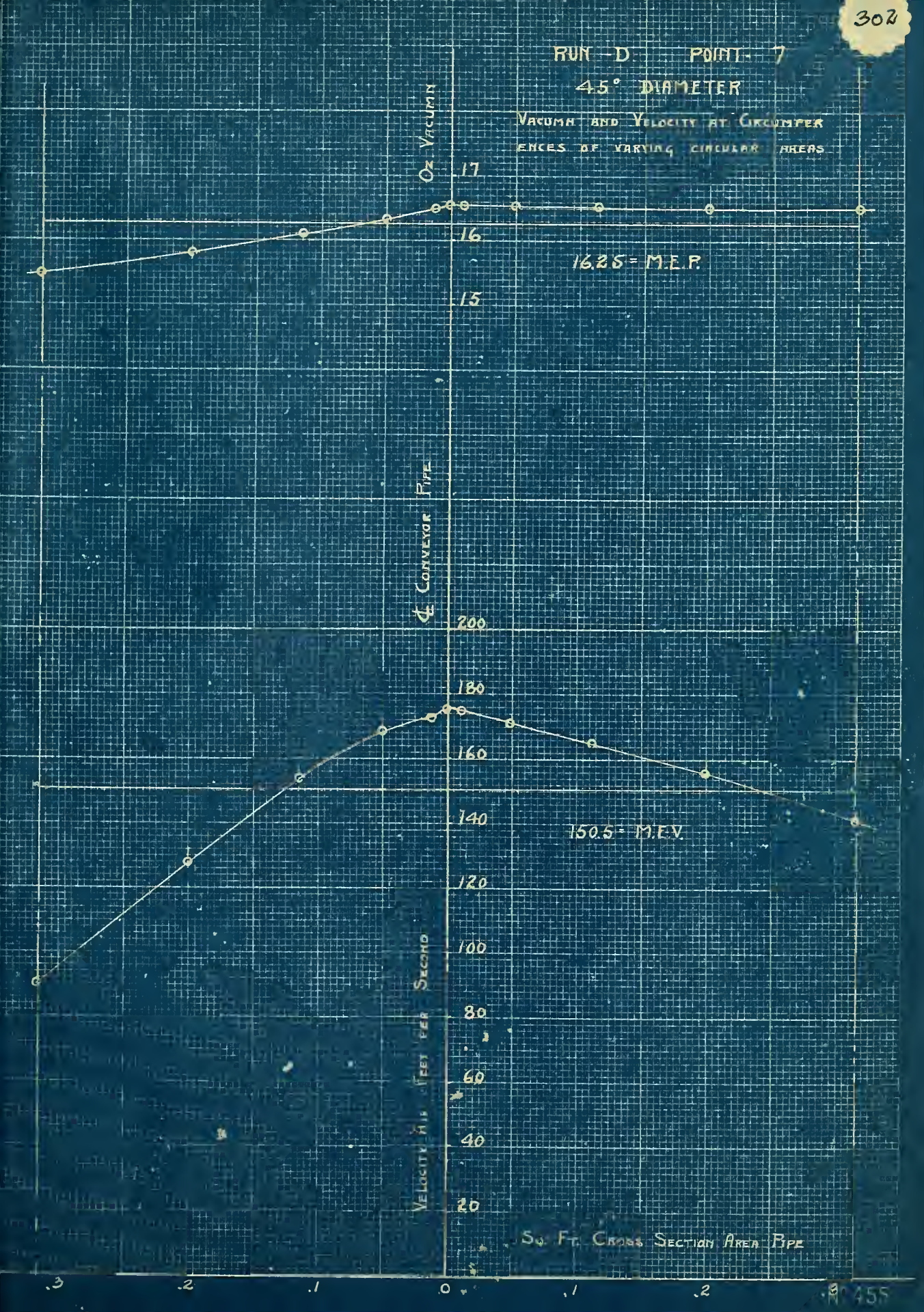
45° DIAMETER

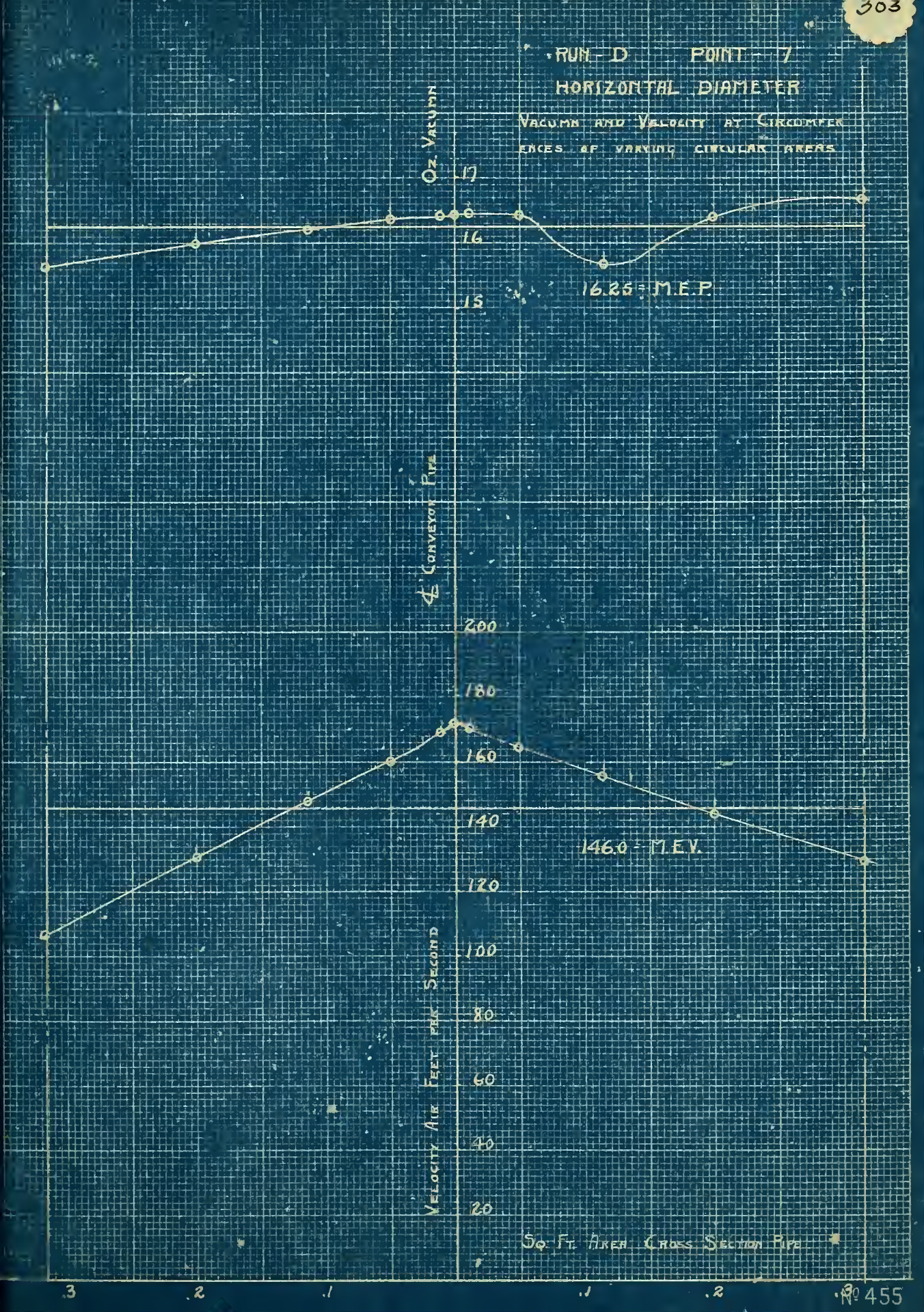
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS

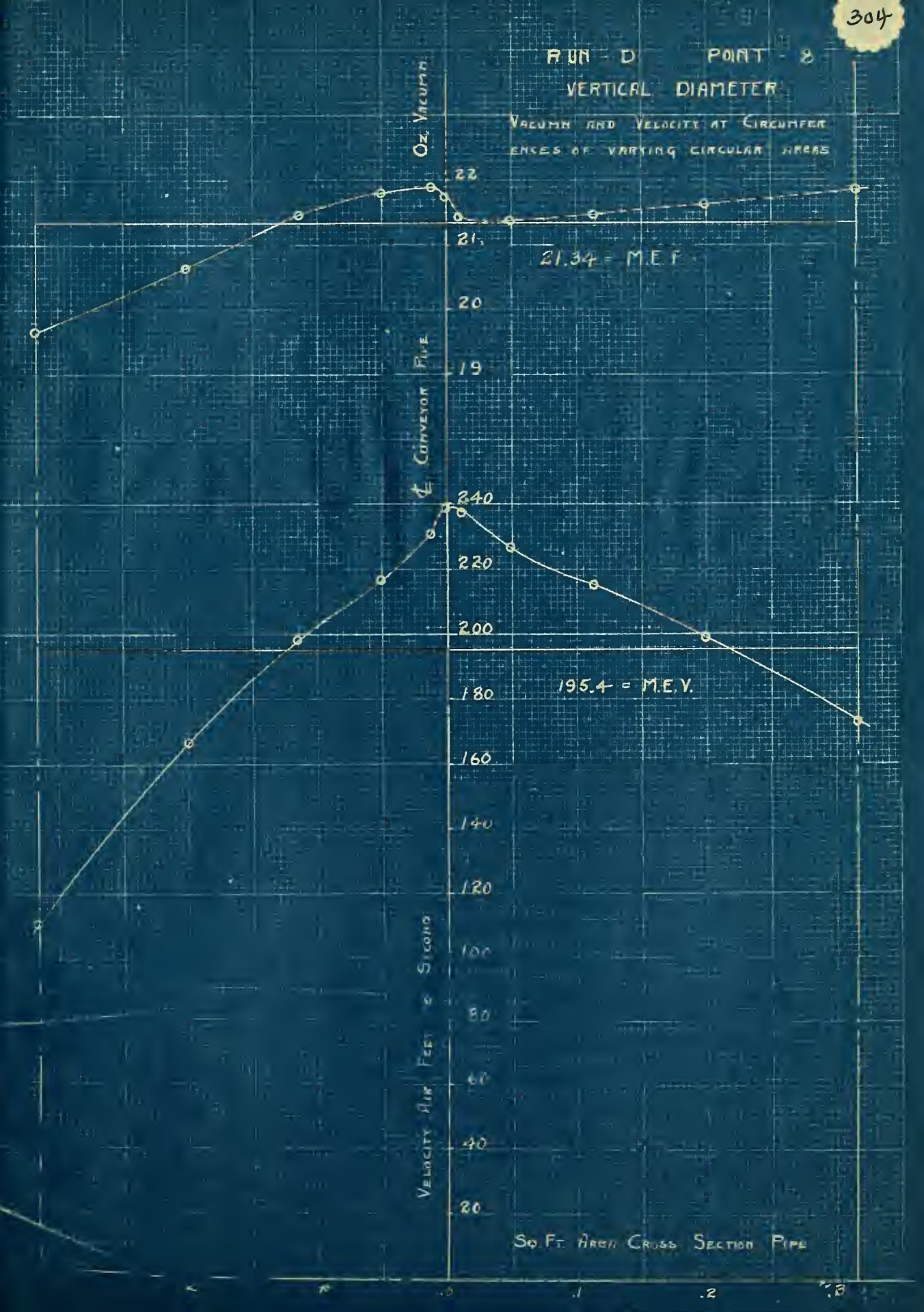


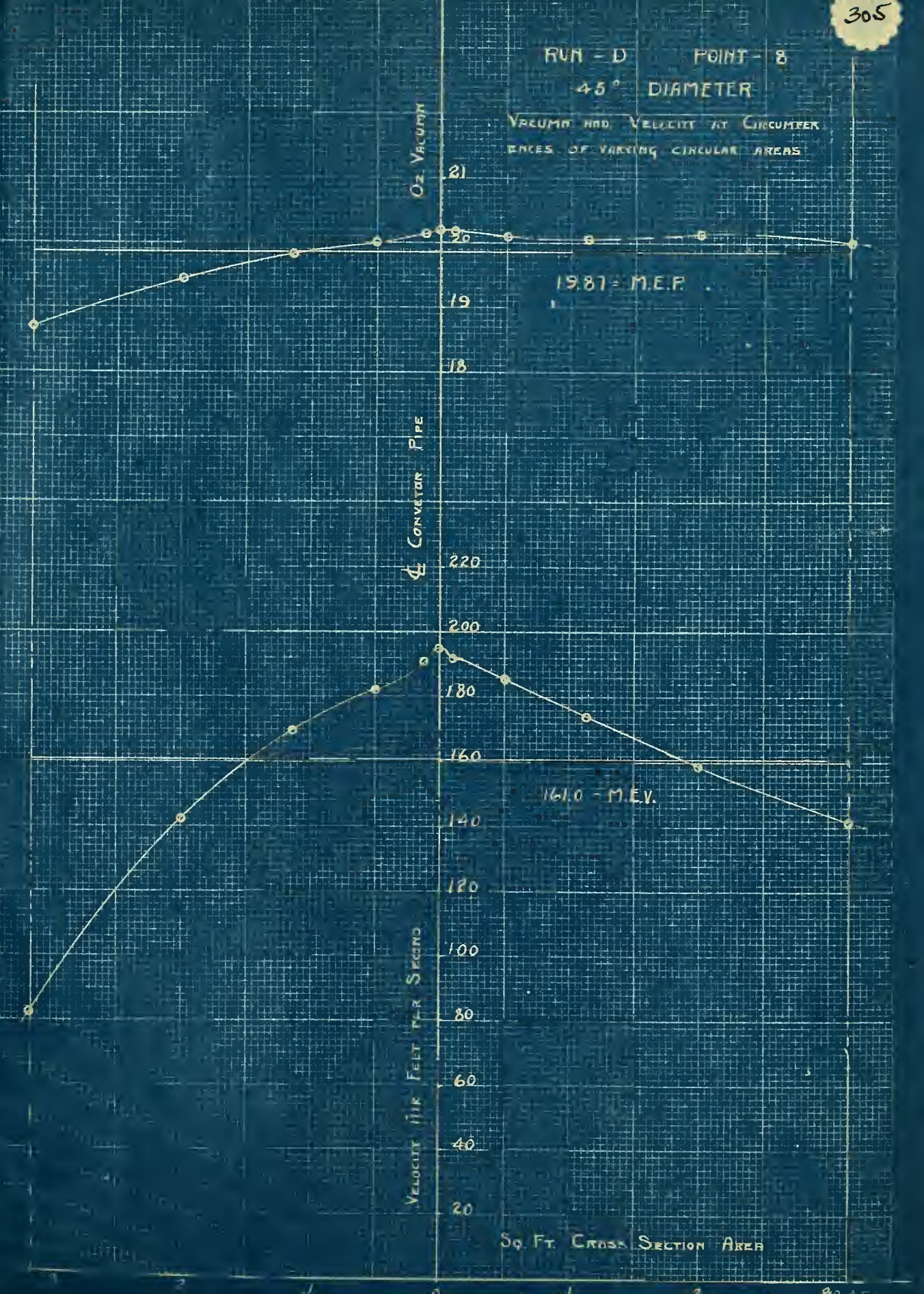

RUN - D POINT - 7
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS
OZ. VACUUM
17
16
15
15.85 = M.E.P.
CU. FT. CONVEYOR PIPE
200
180
160
140
120
100
80
60
40
20
152.0 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. CROSS SECTION AREA PIPE
.3
.2
.1
0
.1
.2
A 455

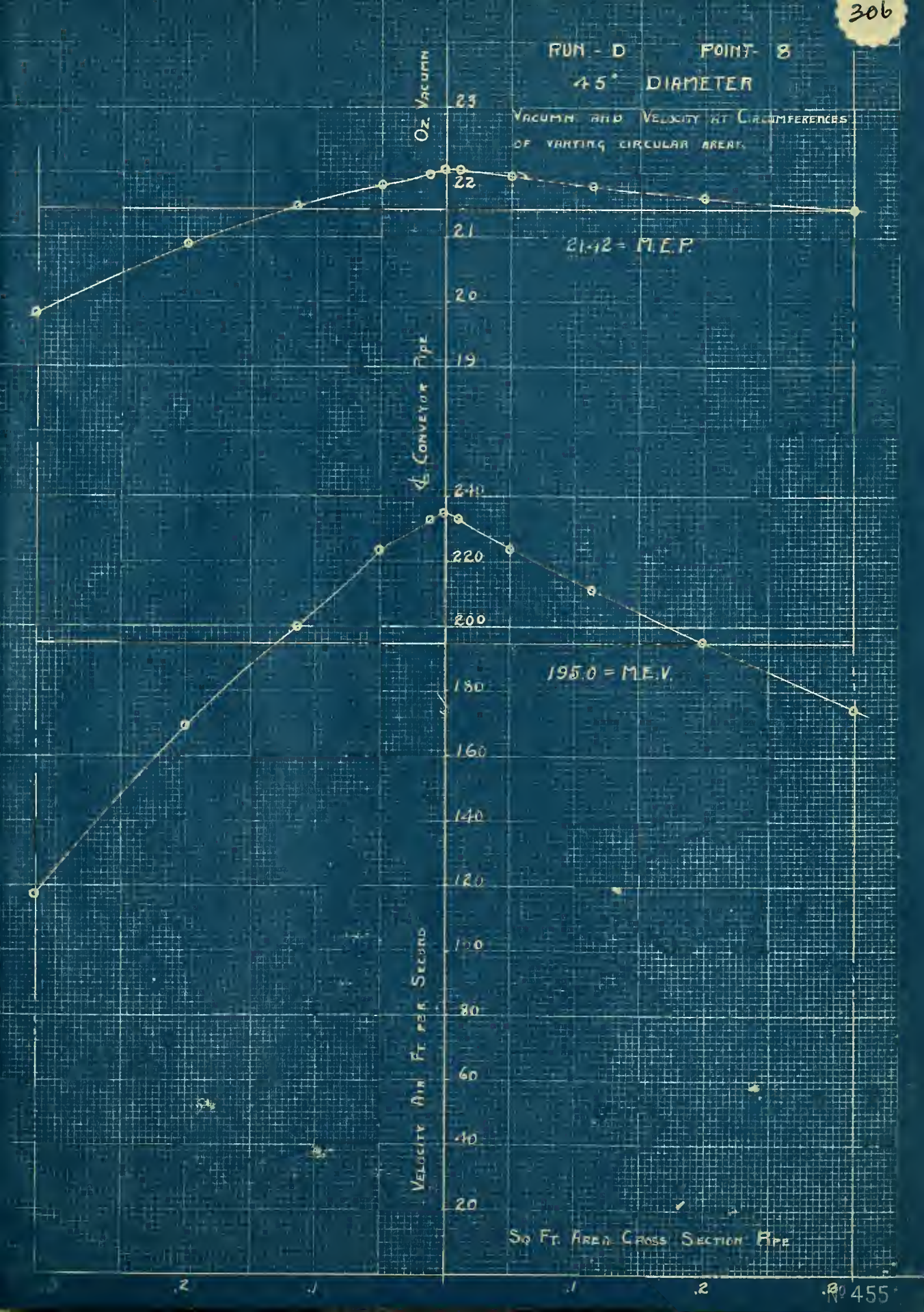

RUN - D POINT - 7
45° DIAMETER
VACUMN AND VELOCITY AT CIRCUMFER
ENCES OF VARYING CIRCULAR AREAS
OZ. VACUMN
18
17
17.12 = M.E.P.
16
℄ CONVEYOR PIPE
200
180
160
159.0 = M.E.V.
140
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. CROSS SECTION AREA PIPE
.3
.2
.1
0
.1
.2
No 455

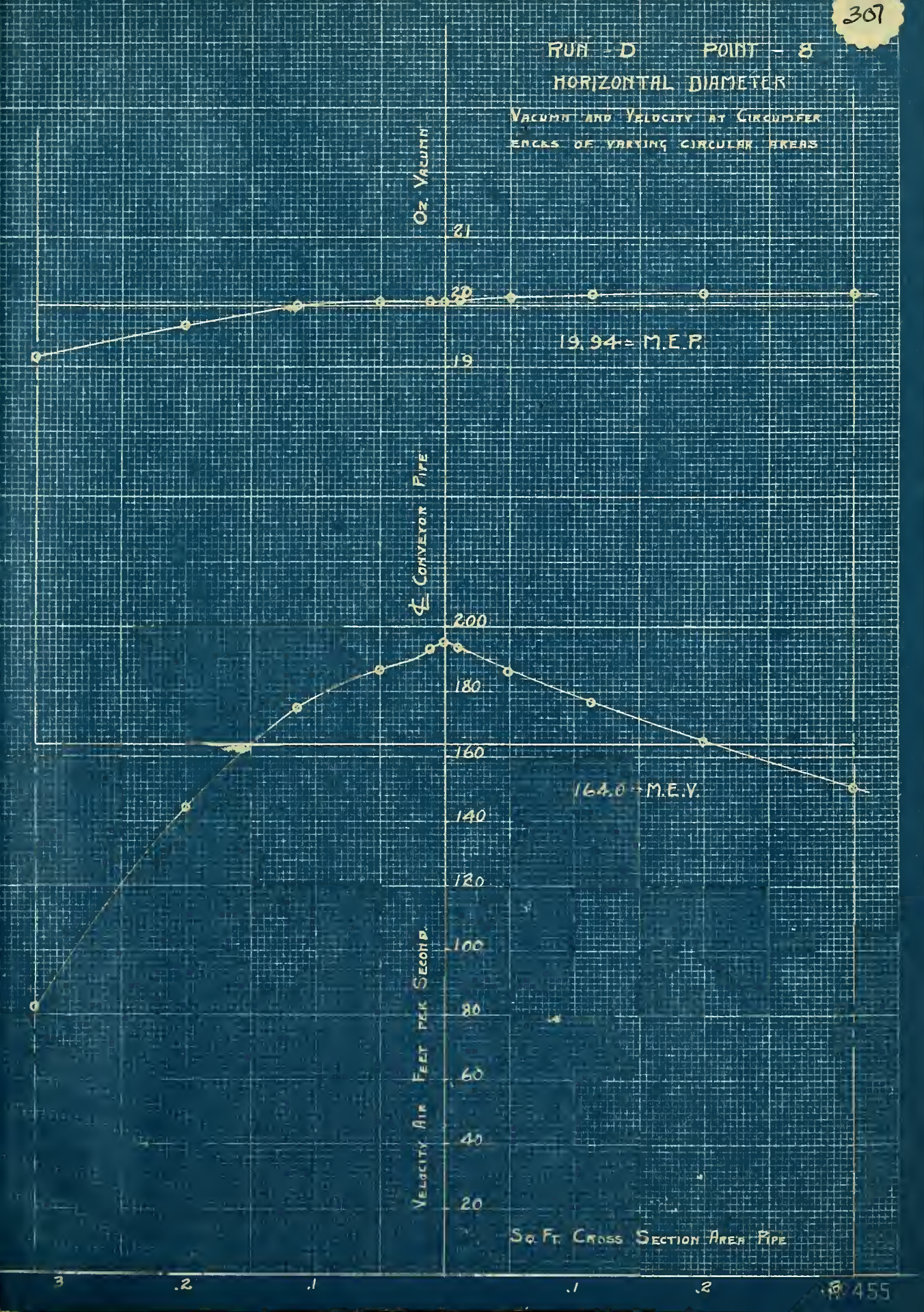

RUN - D POINT - 7
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS
OZ. VACUUM
17
16
15
16.25 = M.E.P.
CONVEYOR PIPE
200
180
160
140
120
100
80
60
40
20
150.5 = M.E.V.
VELOCITY MILES PER SECOND
SQ. FT. CROSS SECTION AREA PIPE
.3
.2
.1
0
.1
.2
N 455

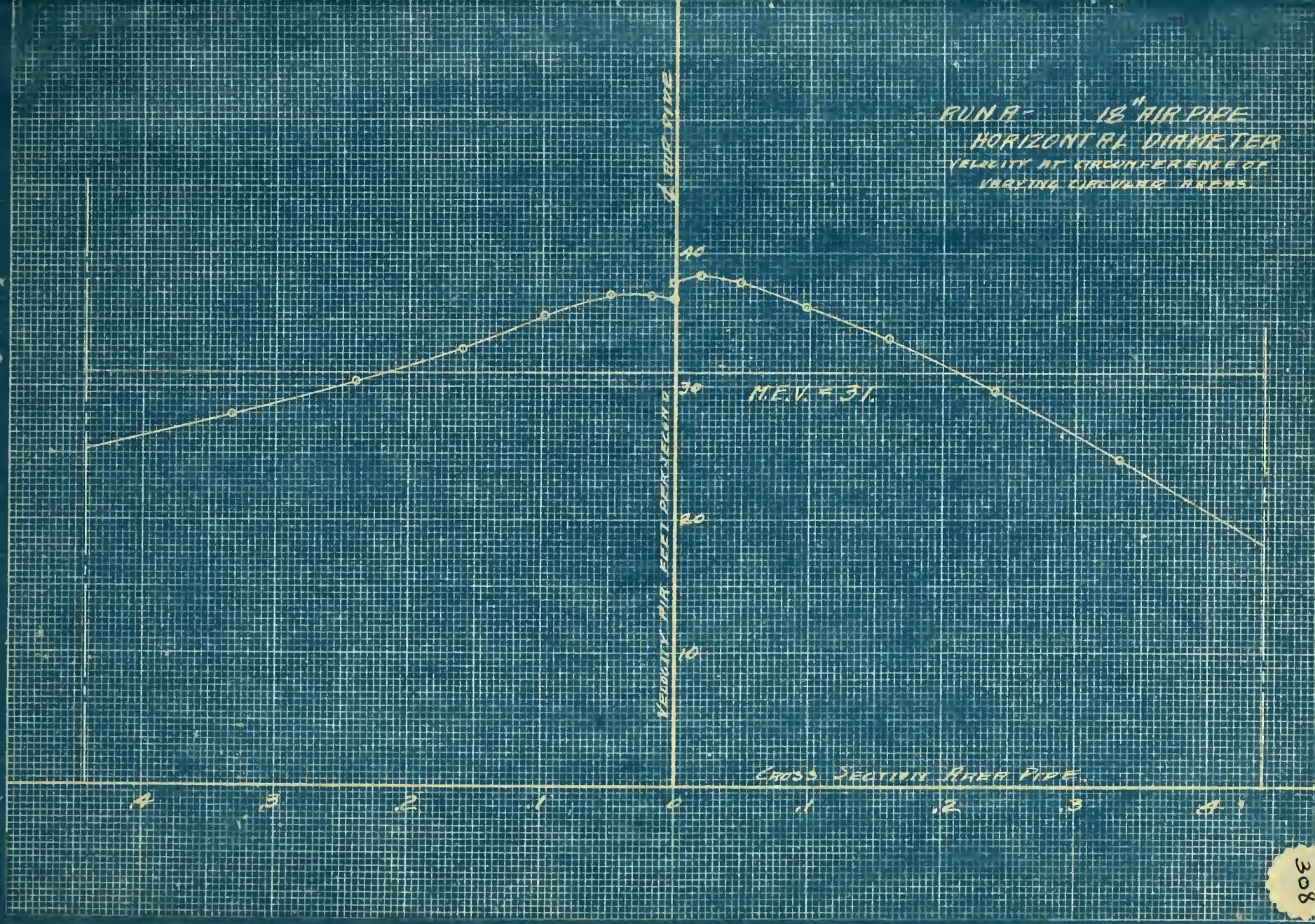

RUN D POINT 7
HORIZONTAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS
OZ. VACUUM
17
16
15
16.25 = M.E.P.
℄ CONVEYOR PIPE
200
180
160
140
146.0 = M.E.V.
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.3
.2
.1
.1
.2
.3
No 455

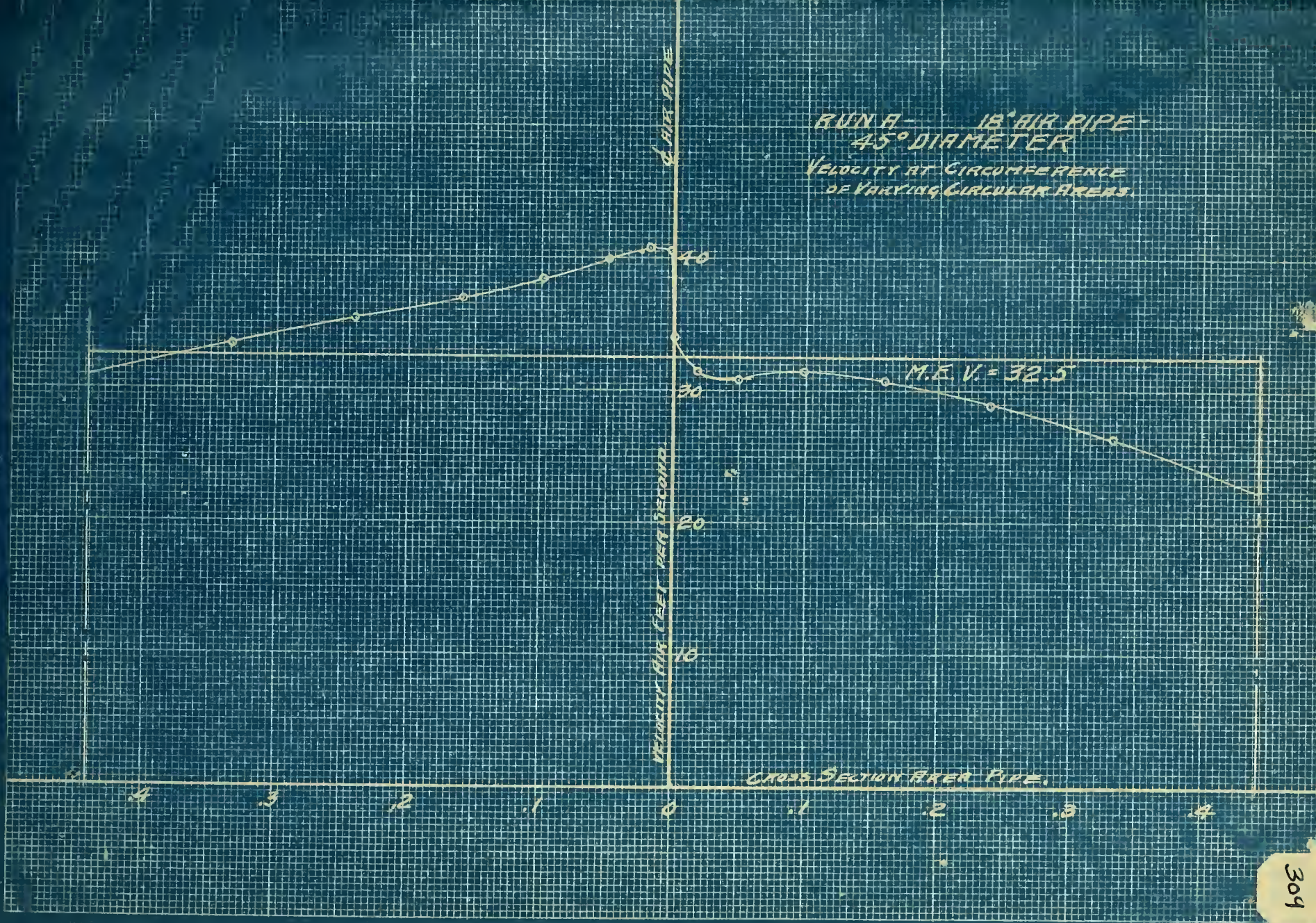

RUN - D POINT - 8
VERTICAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS
OZ. VACUUM
22
21
20
19
21.34 = M.E.F.
℄ CONVEYOR PIPE
240
220
200
180
160
140
120
100
80
60
40
20
195.4 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. AREA CROSS SECTION PIPE
.1
.2
.3

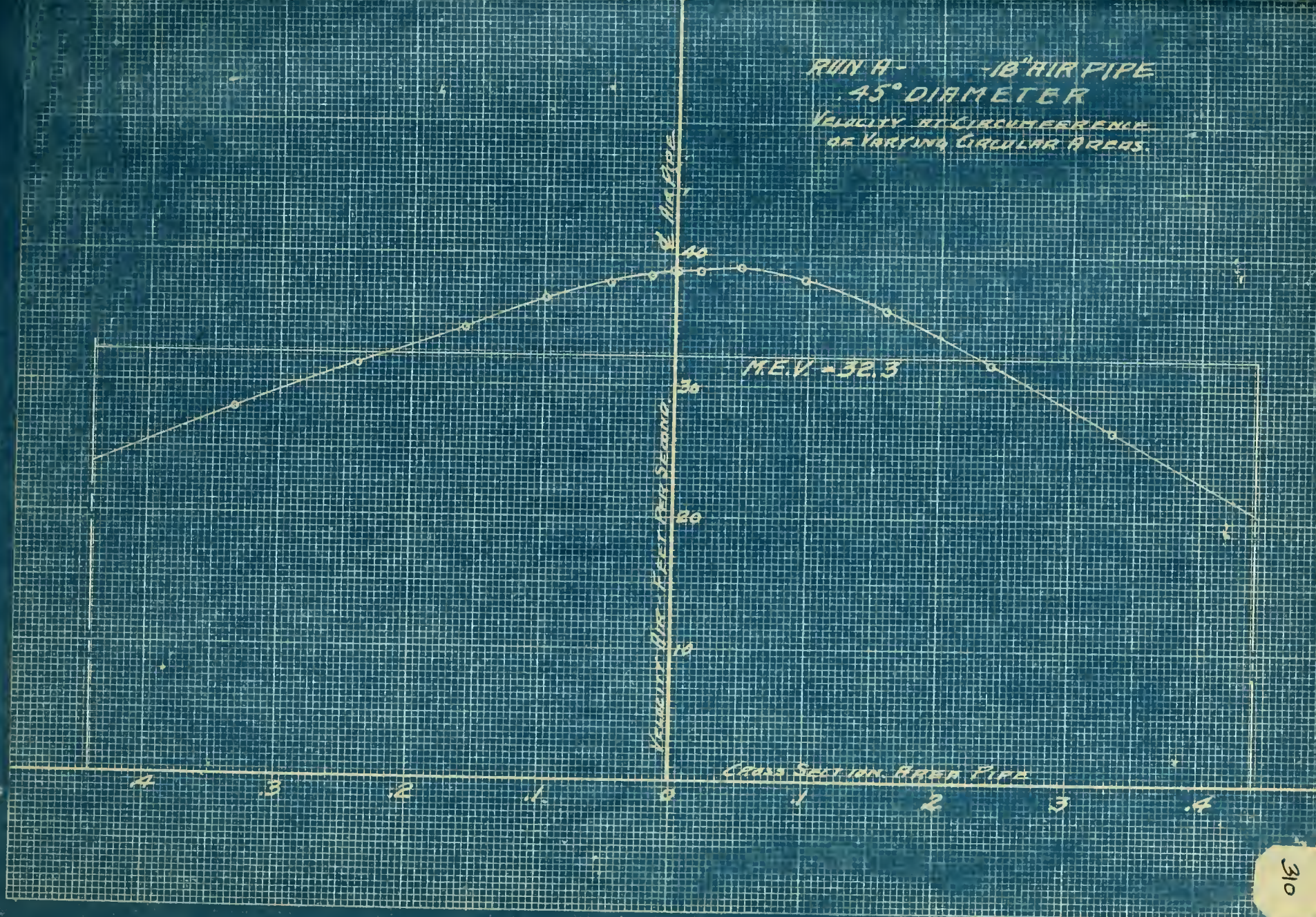

RUN - D POINT - 8
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS
OZ. VACUUM
21
20
19
18
19.87 = M.E.P.
CONVEYOR PIPE
220
200
180
160
161.0 = M.E.V.
140
120
100
80
60
40
20
VELOCITY AIR FEET PER SECOND
SQ. FT. CROSS SECTION AREA
.2
.1
0
.1
.2
.3

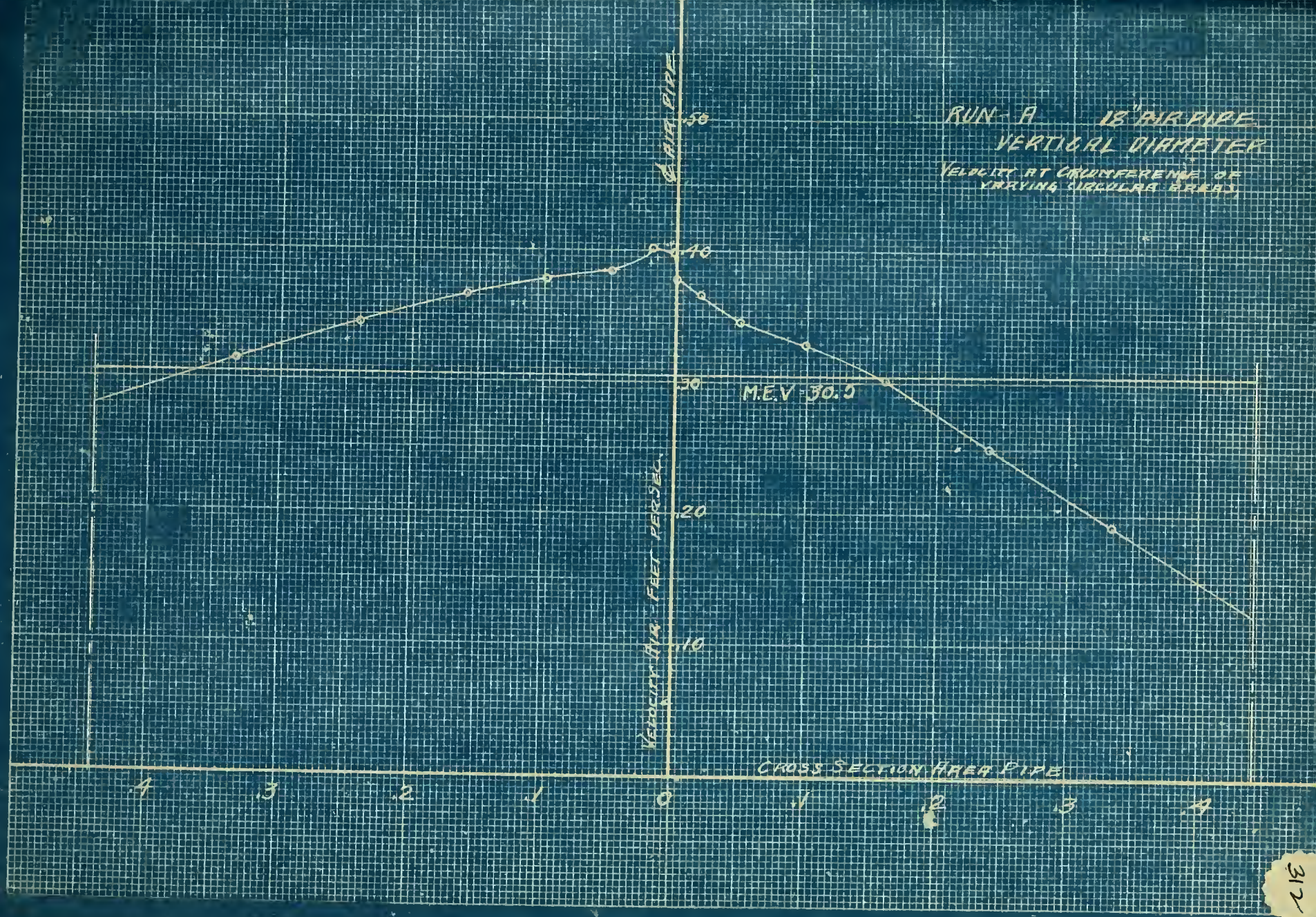

RUN - D POINT - 8
45° DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES
OF VARYING CIRCULAR AREAS.
OZ. VACUUM
23
22
21
20
19
21.42 = M.E.P.
4. CONVEYOR PIPE
240
220
200
180
160
140
120
100
80
60
40
20
195.0 = M.E.V.
VELOCITY AIR FT. PER SECOND
SQ FT. AREA CROSS SECTION PIPE
.3
.2
.1
.1
.2
.3
N 455

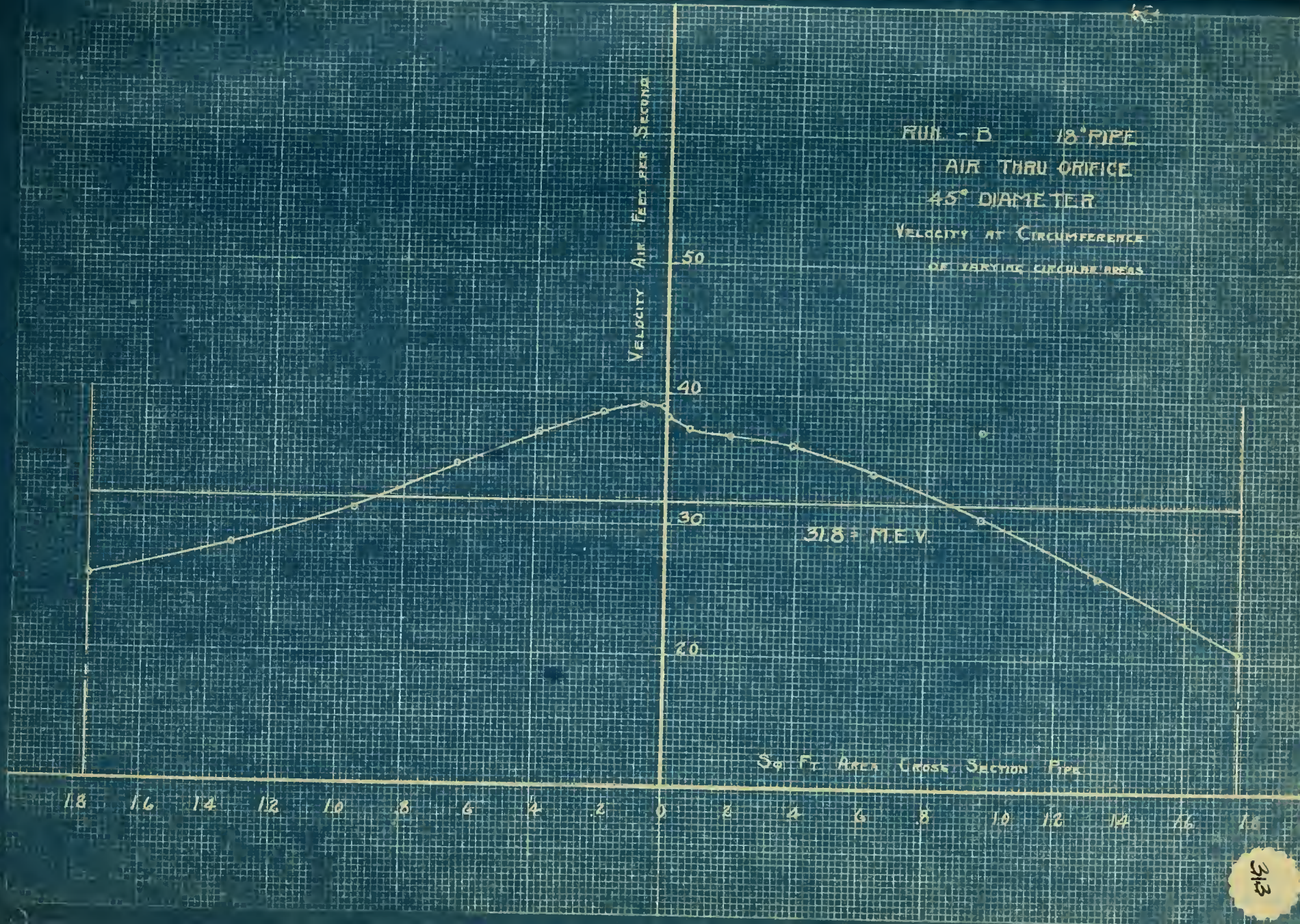

RUN - D POINT - 8
HORIZONTAL DIAMETER
VACUUM AND VELOCITY AT CIRCUMFERENCES OF VARYING CIRCULAR AREAS
OZ. VACUUM
21
20
19
19.94 = M.E.P.
℄ CONVEYOR PIPE
200
180
160
140
120
100
80
60
40
20
164.0 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FT. CROSS SECTION AREA PIPE
.3
.2
.1
.1
.2
.3

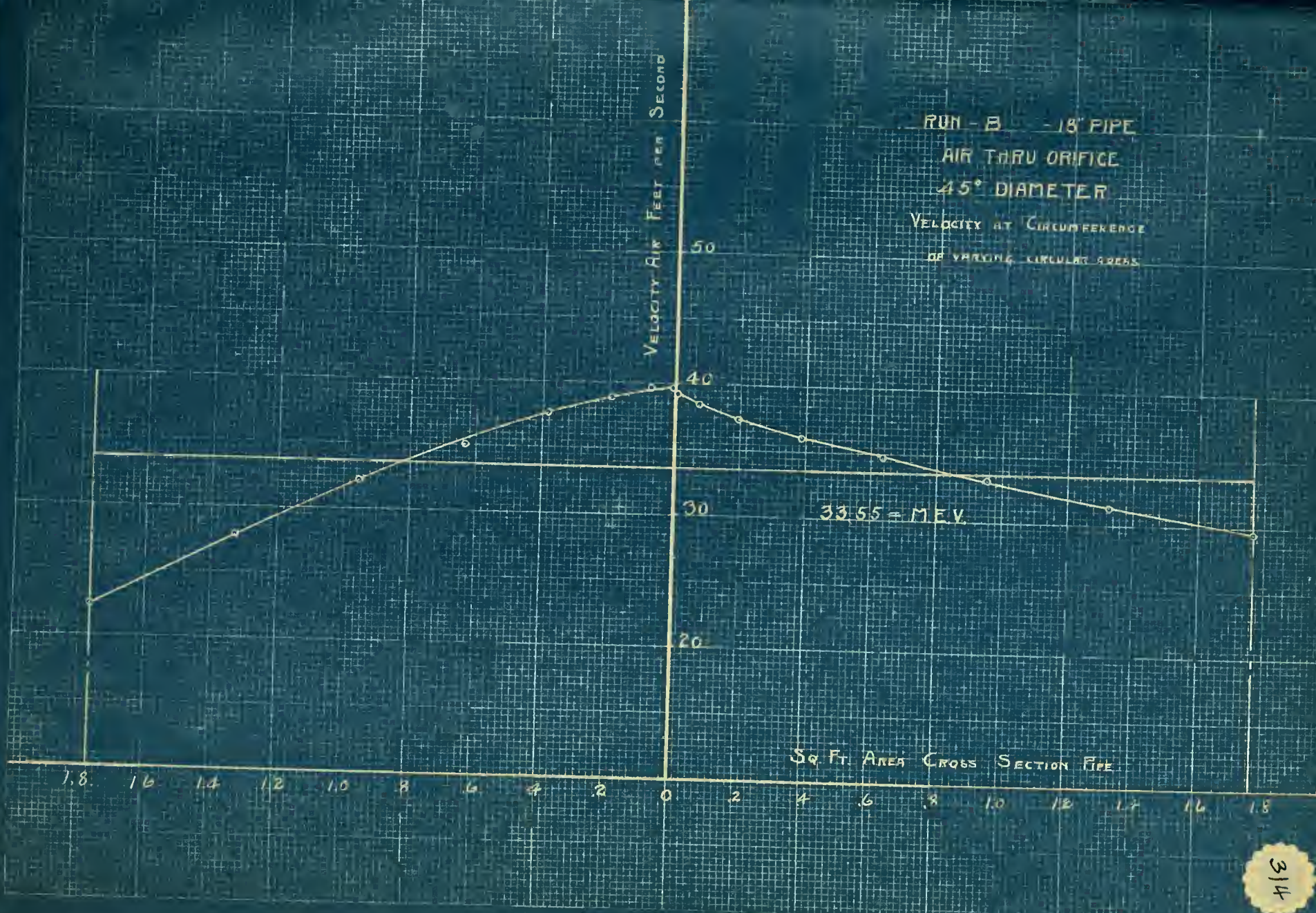

RUN A- 18" AIR PIPE
HORIZONTAL DIAMETER
VELOCITY AT CIRCUMFERENCE OF
VARYING CIRCULAR AREAS.
VELOCITY AIR FEET PER SECOND
40
30
20
10
M.E.V. = 31.
CROSS SECTION AREA PIPE.
.4
.3
.2
.1
0
.1
.2
.3
.4

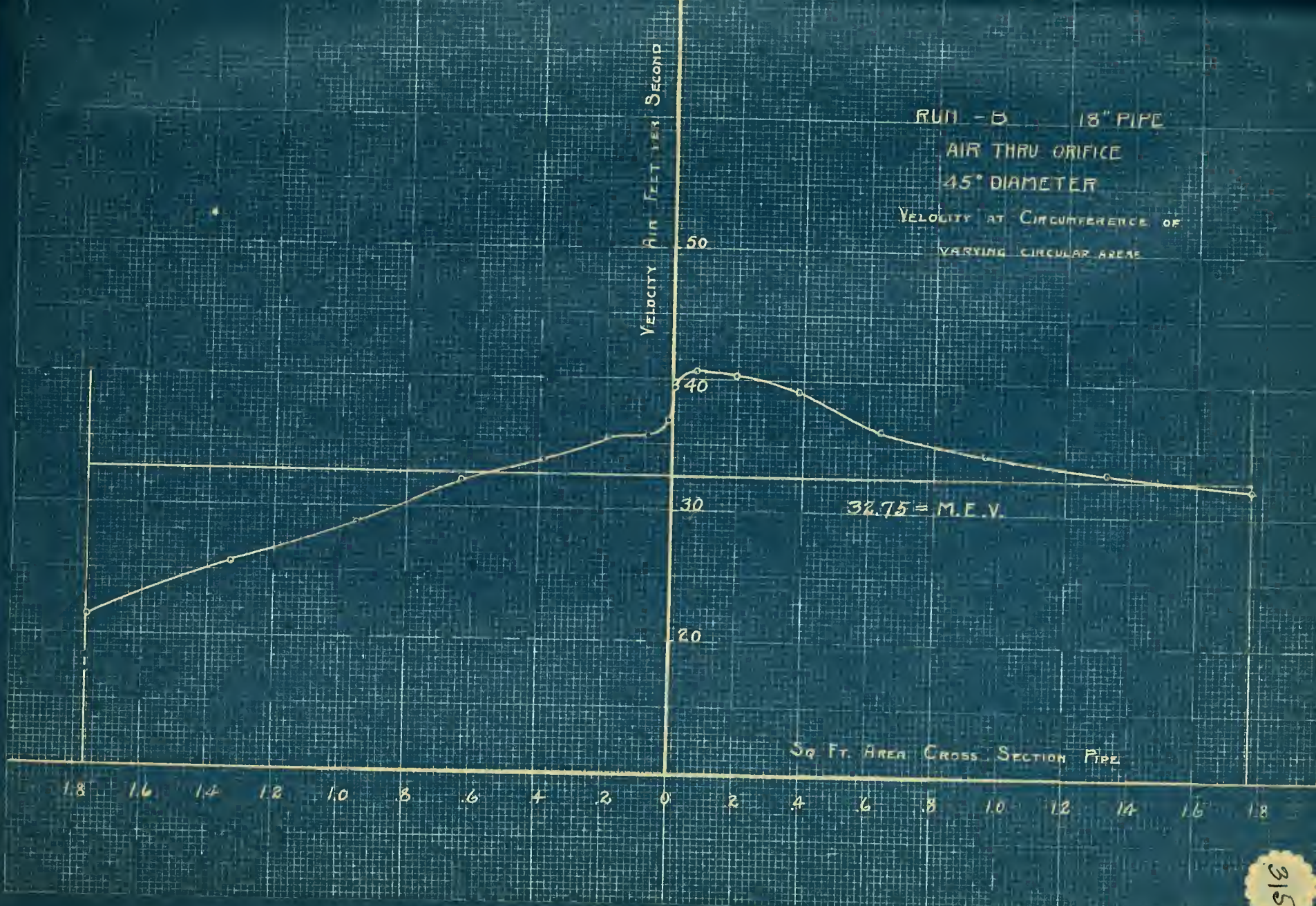

RUN A— 18" AIR PIPE—
45° DIAMETER
VELOCITY AT CIRCUMFERENCE
OF VARYING CIRCULAR AREAS.
℄ AIR PIPE
40
30
20
10
M.E.V. = 32.5
VELOCITY AIR FEET PER SECOND
CROSS SECTION AREA PIPE.
.4
.3
.2
.1
0
.1
.2
.3
.4

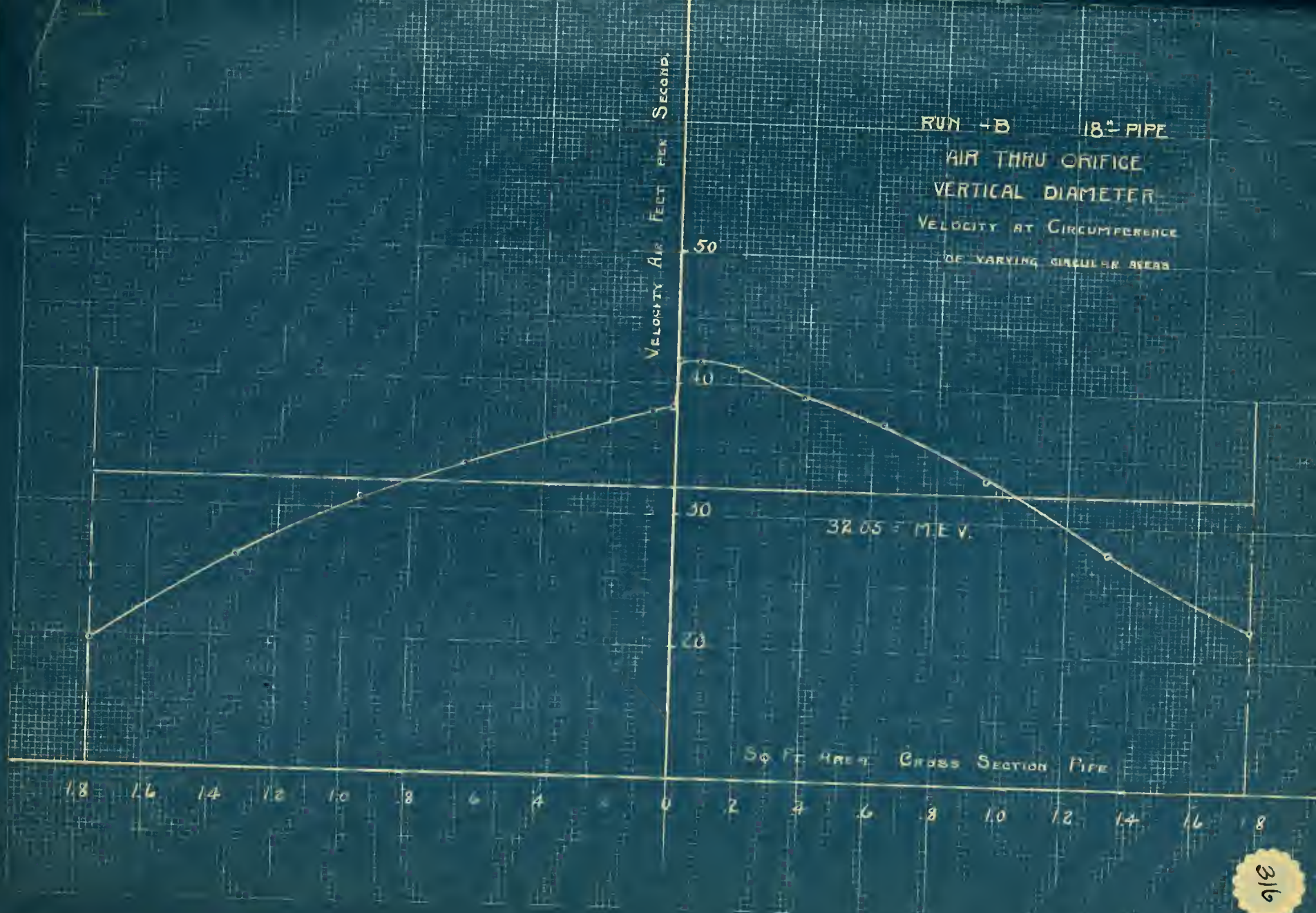

RUN A - 18" AIR PIPE
.45° DIAMETER
VELOCITY AT CIRCUMFERENCE
OF VARYING CIRCULAR AREAS.
M.E.V. = 32.3
VELOCITY IN FEET PER SECOND.
CROSS SECTION AREA PIPE
40
30
20
10
.4
.3
.2
.1
0
.1
.2
.3
.4

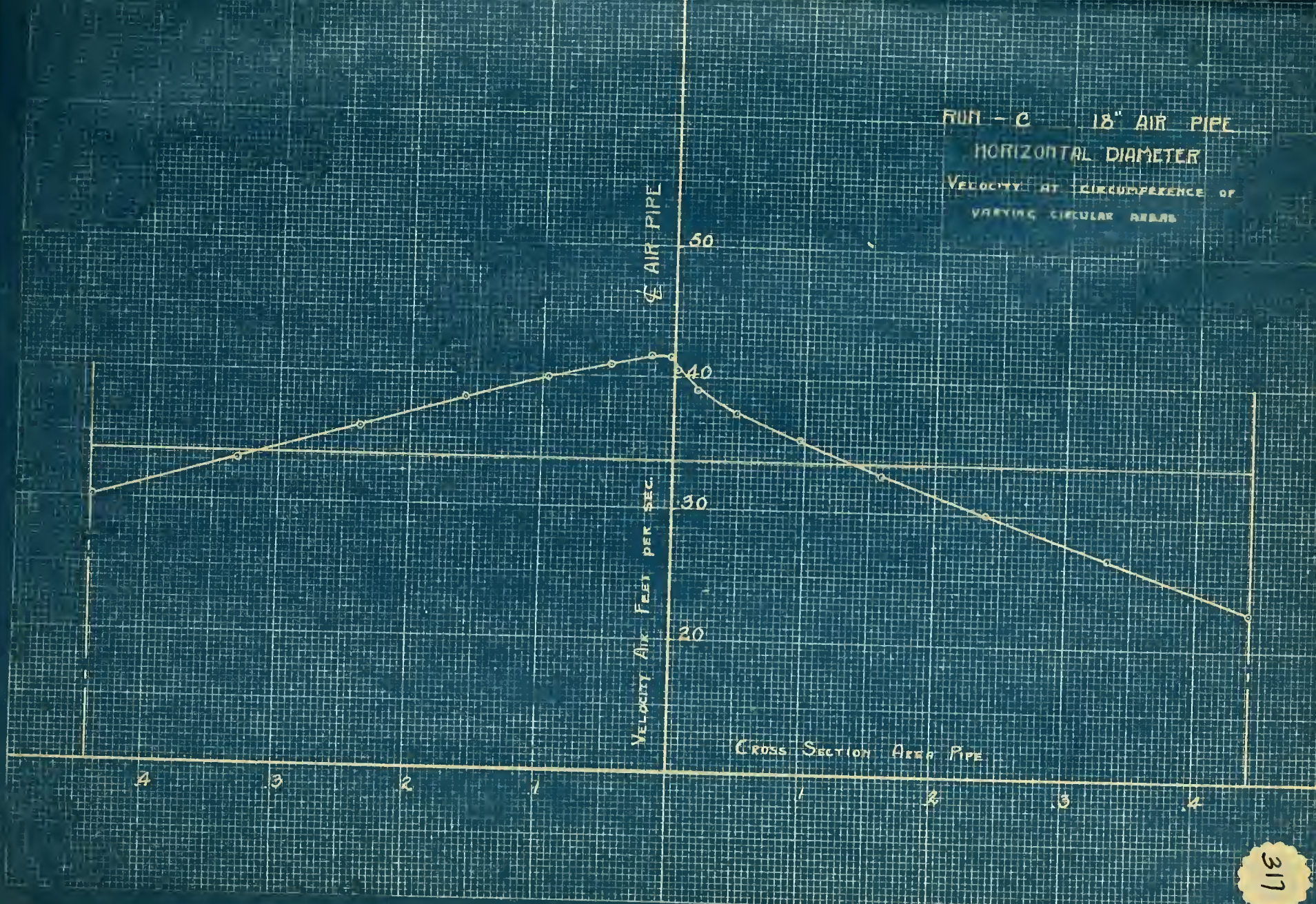

RUN - A 18" AIR PIPE
VERTICAL DIAMETER
VELOCITY AT CIRCUMFERENCE OF
VARYING CIRCULAR AREAS
VELOCITY IN FEET PER SEC.
50
40
30
20
10
M.E.V 30.5
CROSS SECTION AREA PIPE
.4
.3
.2
.1
0
.1
.2
.3
.4

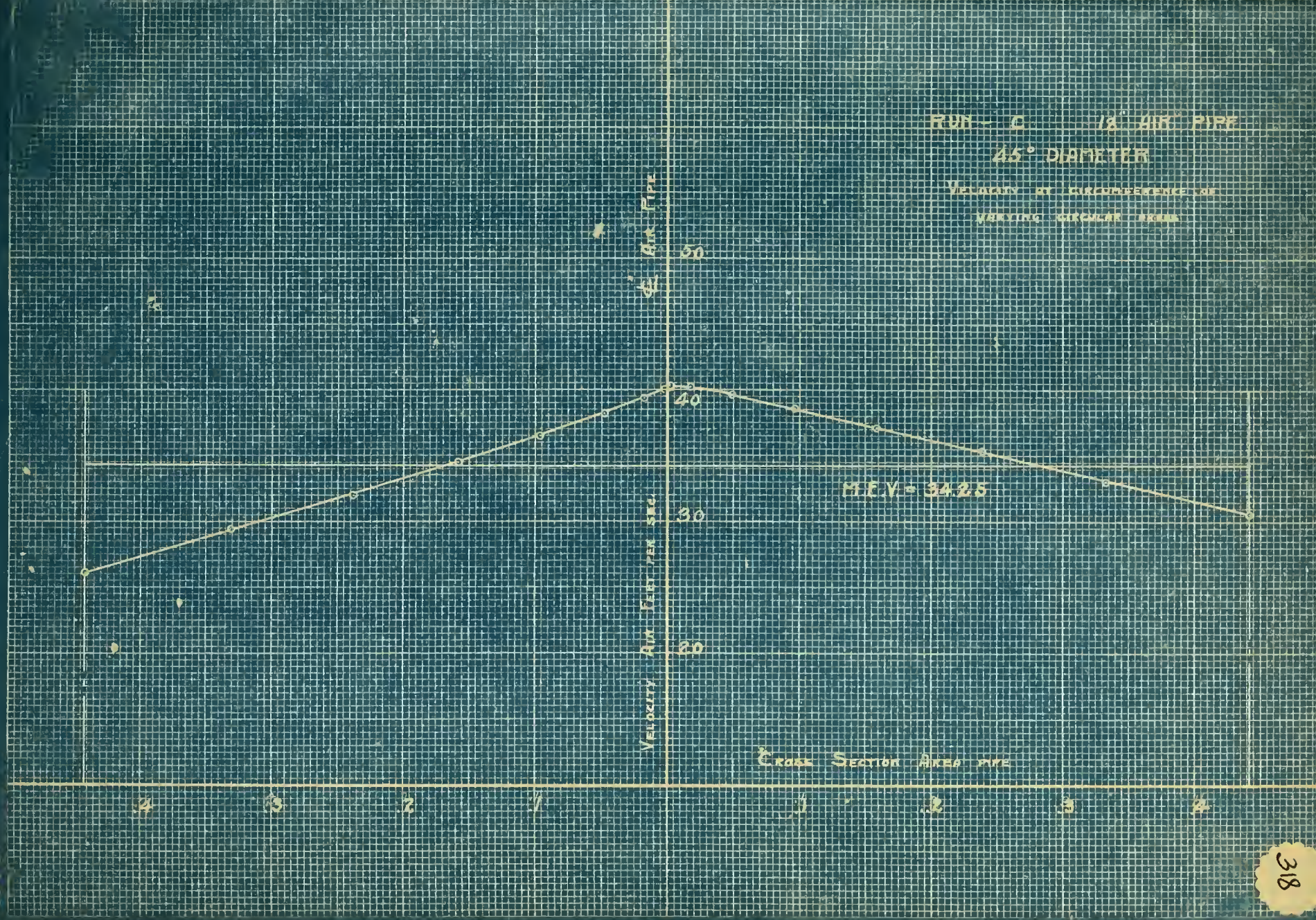

RUN - B 18" PIPE
AIR THRU ORIFICE
4.5" DIAMETER
VELOCITY AT CIRCUMFERENCE
OF VARYING CIRCULAR AREAS
VELOCITY AIR FEET PER SECOND
50
40
30
20
31.8 = M.E.V.
SQ. FT. AREA CROSS SECTION PIPE
18 16 14 12 10 8 6 4 2 0 2 4 6 8 10 12 14 16 18


RUN - B - 18" PIPE
AIR THRU ORIFICE
.45° DIAMETER
VELOCITY AT CIRCUMFERENCE
OF VARYING CIRCULAR AREAS
VELOCITY AIR FEET PER SECOND
50
40
30
20
33.55 = M.E.V.
SQ. FT. AREA CROSS SECTION PIPE
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
0
.2
.4
.6
.8
1.0
1.2
1.4
1.6
1.8

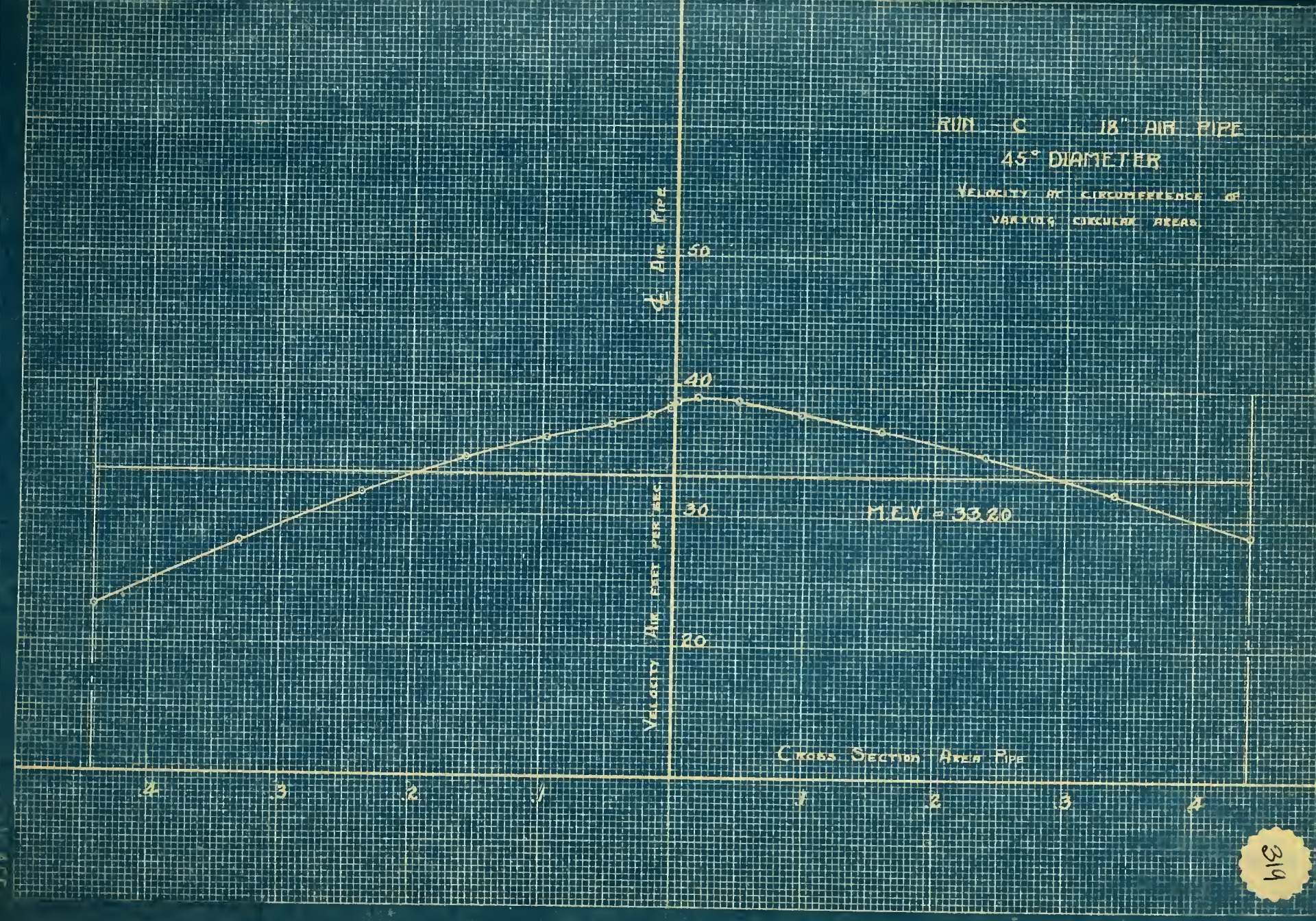

RUN - B 18" PIPE
AIR THRU ORIFICE
.45" DIAMETER
VELOCITY AT CIRCUMFERENCE OF
VARYING CIRCULAR AREAS
VELOCITY AIR FEET PER SECOND
50
40
30
20
32.75 = M.E.V.
SQ. FT. AREA CROSS SECTION PIPE
1.8 1.6 1.4 1.2 1.0 .8 .6 .4 .2 0 .2 .4 .6 .8 1.0 1.2 1.4 1.6 1.8

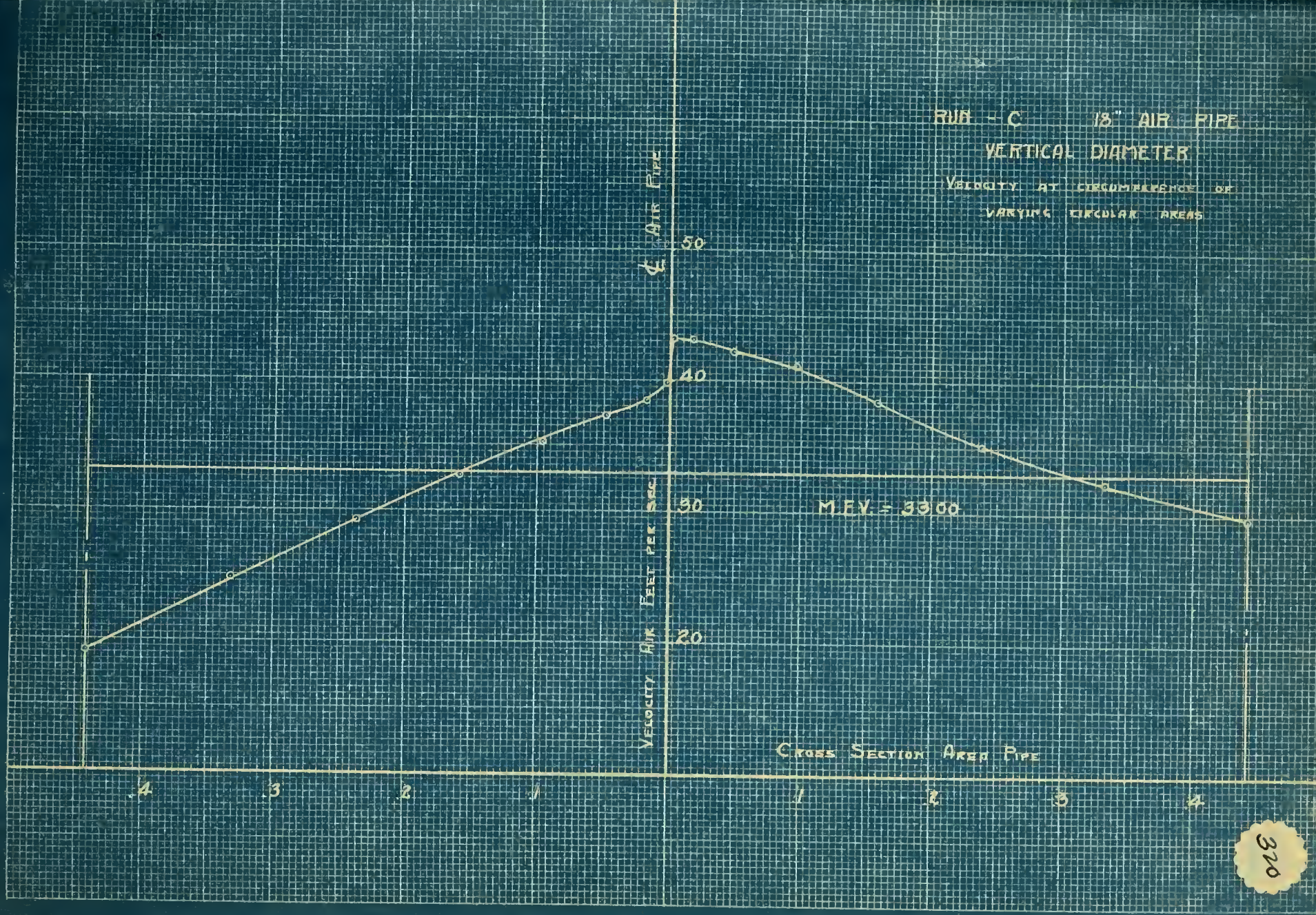

RUN 4B 18" PIPE
AIR THRU ORIFICE
VERTICAL DIAMETER
VELOCITY AT CIRCUMFERENCE
OF VARYING CIRCULAR AREAS
VELOCITY AIR FEET PER SECOND
50
40
30
20
32.05 = M.E.V.
SQ. FT. AREA CROSS SECTION PIPE
1.8 1.6 1.4 1.2 1.0 .8 .6 .4 0 .2 .4 .6 .8 1.0 1.2 1.4 1.6 1.8

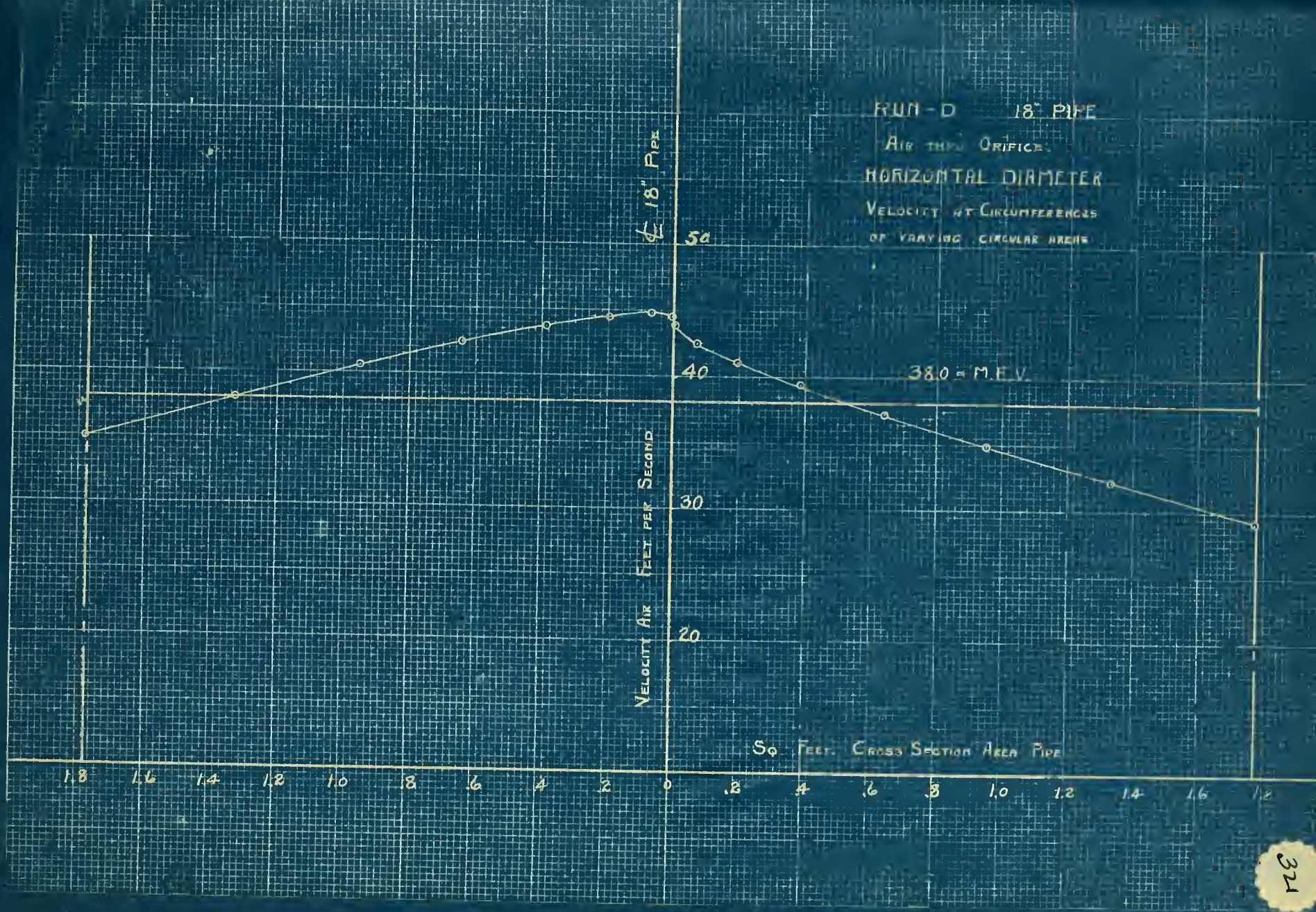

RUN - C 18" AIR PIPE
HORIZONTAL DIAMETER
VELOCITY AT CIRCUMFERENCE OF
VARYING CIRCULAR AREAS
℄ AIR PIPE
50
40
30
20
VELOCITY AIR FEET PER SEC.
CROSS SECTION AREA PIPE
.4
.3
.2
.1
.1
.2
.3
.4

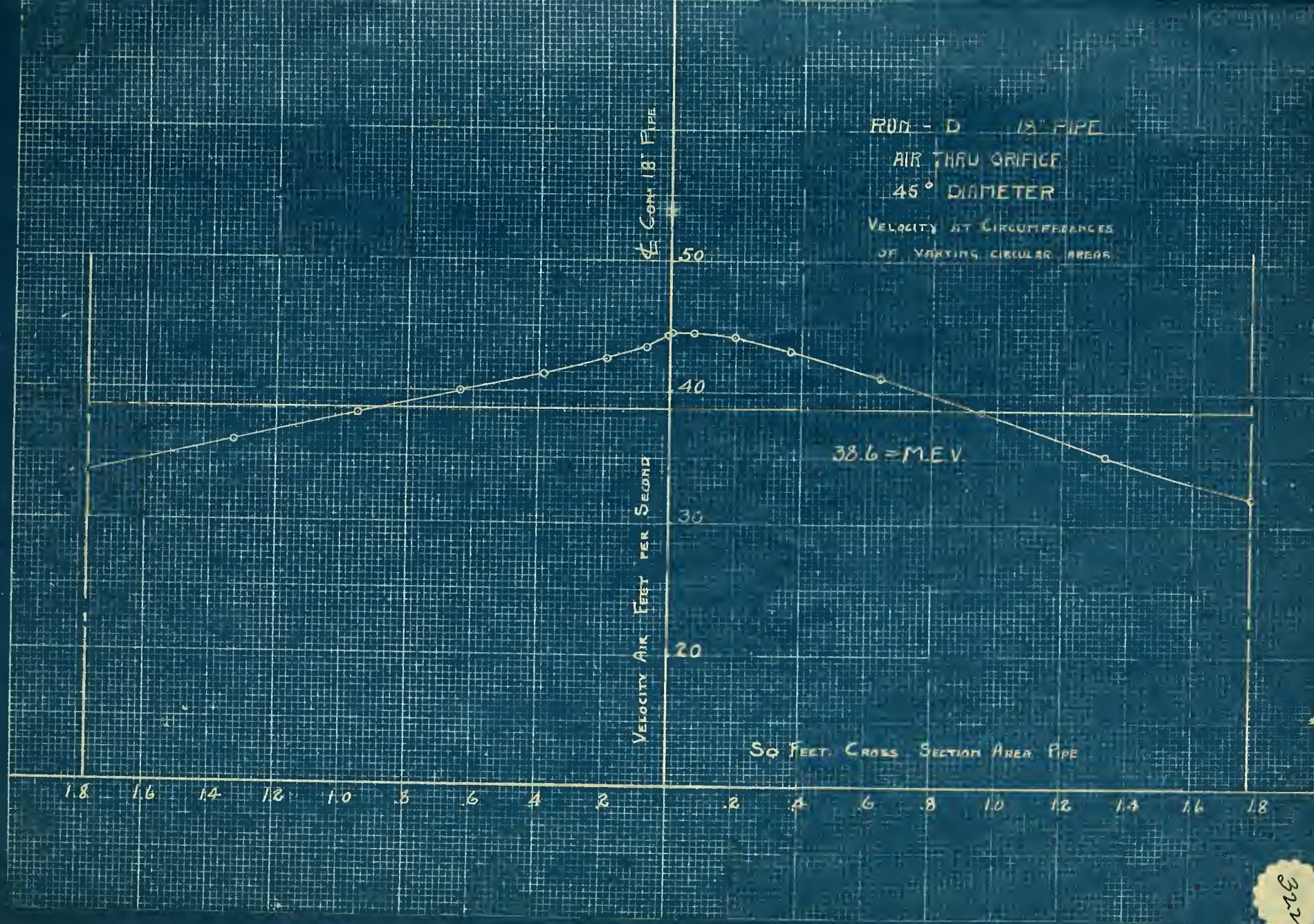

RUN - C 18" AIR PIPE
45° DIAMETER
VELOCITY AT CIRCUMFERENCE OF
VARYING CIRCULAR AREA
℄ AIR PIPE
50
40
30
20
M.E.V = 34.25
VELOCITY AIR FEET PER SEC.
℄ CROSS SECTION AIRED PIPE
.4
.3
.2
.1
.1
.2
.3
.4

318

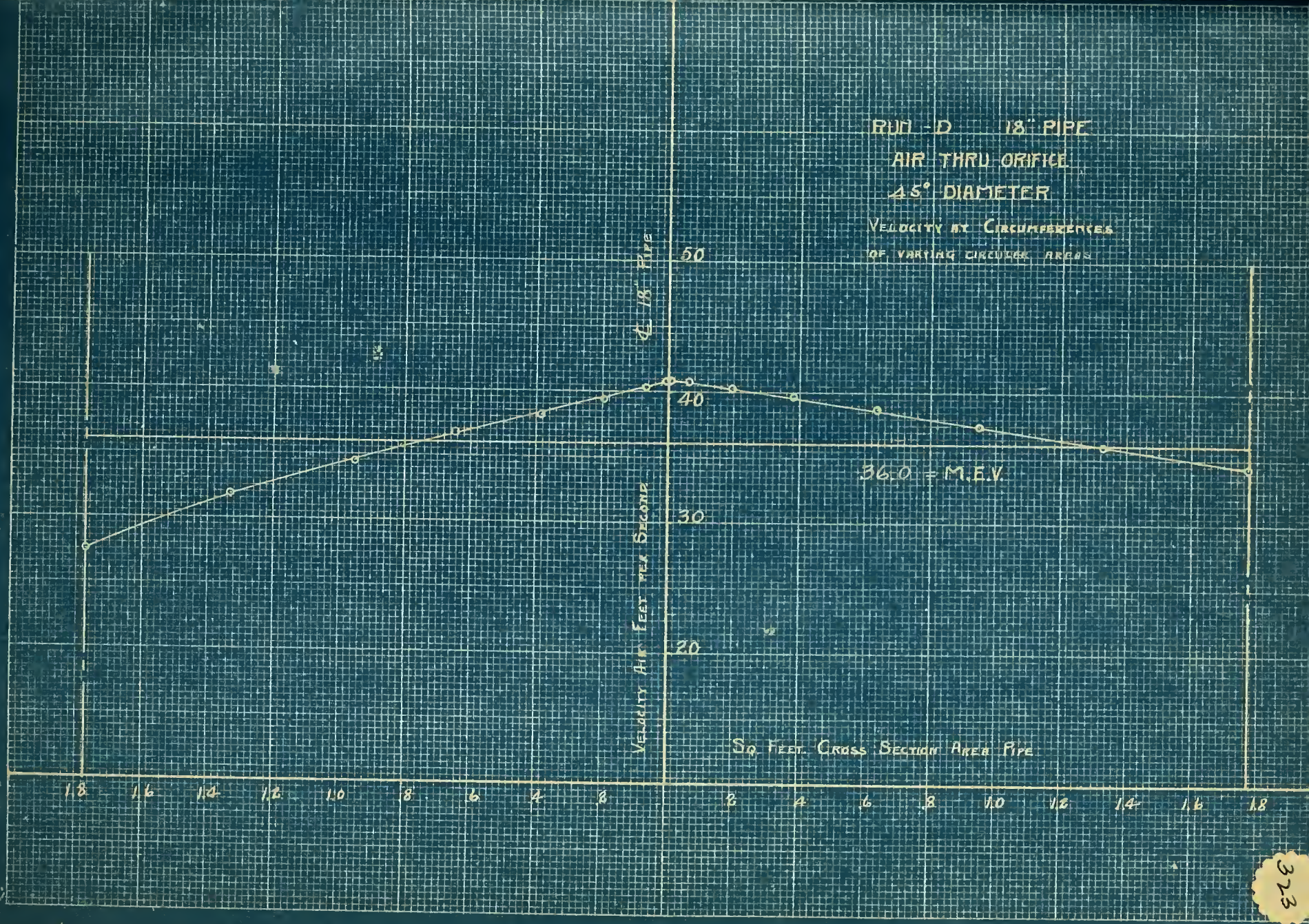

RUN C 18" AIR PIPE
45° DIAMETER
VELOCITY AT CIRCUMFERENCE OF
VARYING CIRCULAR AREAS.
Velocity Air Pipe
Velocity Air Feet per Sec.
50
40
30
20
M.E.V = 33.20
Cross Section Area Pipe
4
3
2
1
1
2
3
4

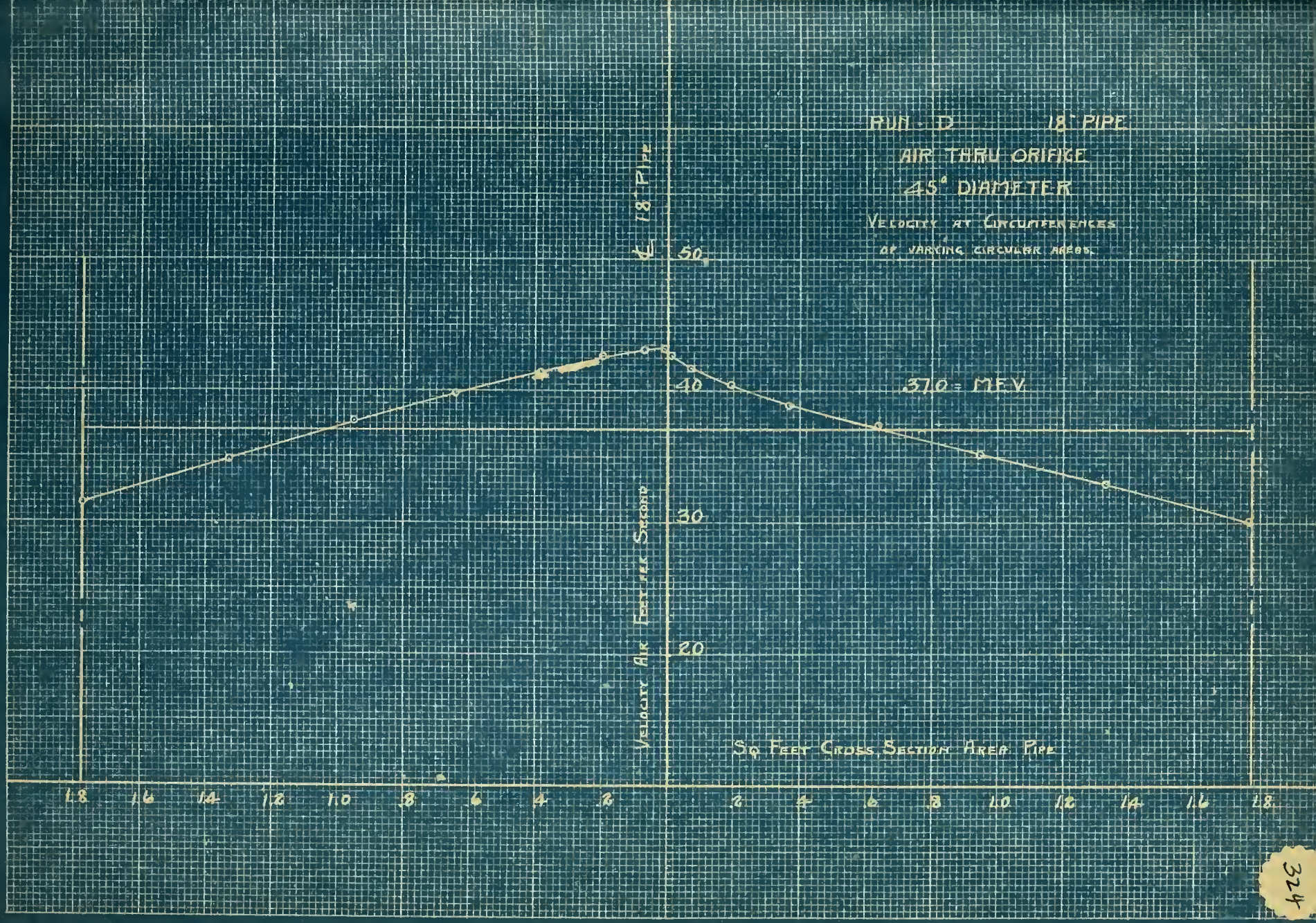

RUN - C 18" AIR PIPE
VERTICAL DIAMETER
VELOCITY AT CIRCUMFERENCE OF
VARYING CIRCULAR AREAS
℄ AIR PIPE
50
40
30
20
VELOCITY AIR FEET PER SEC
M.E.V. = 3300
CROSS SECTION AREA PIPE
4
3
2
1
1
2
3
4
320

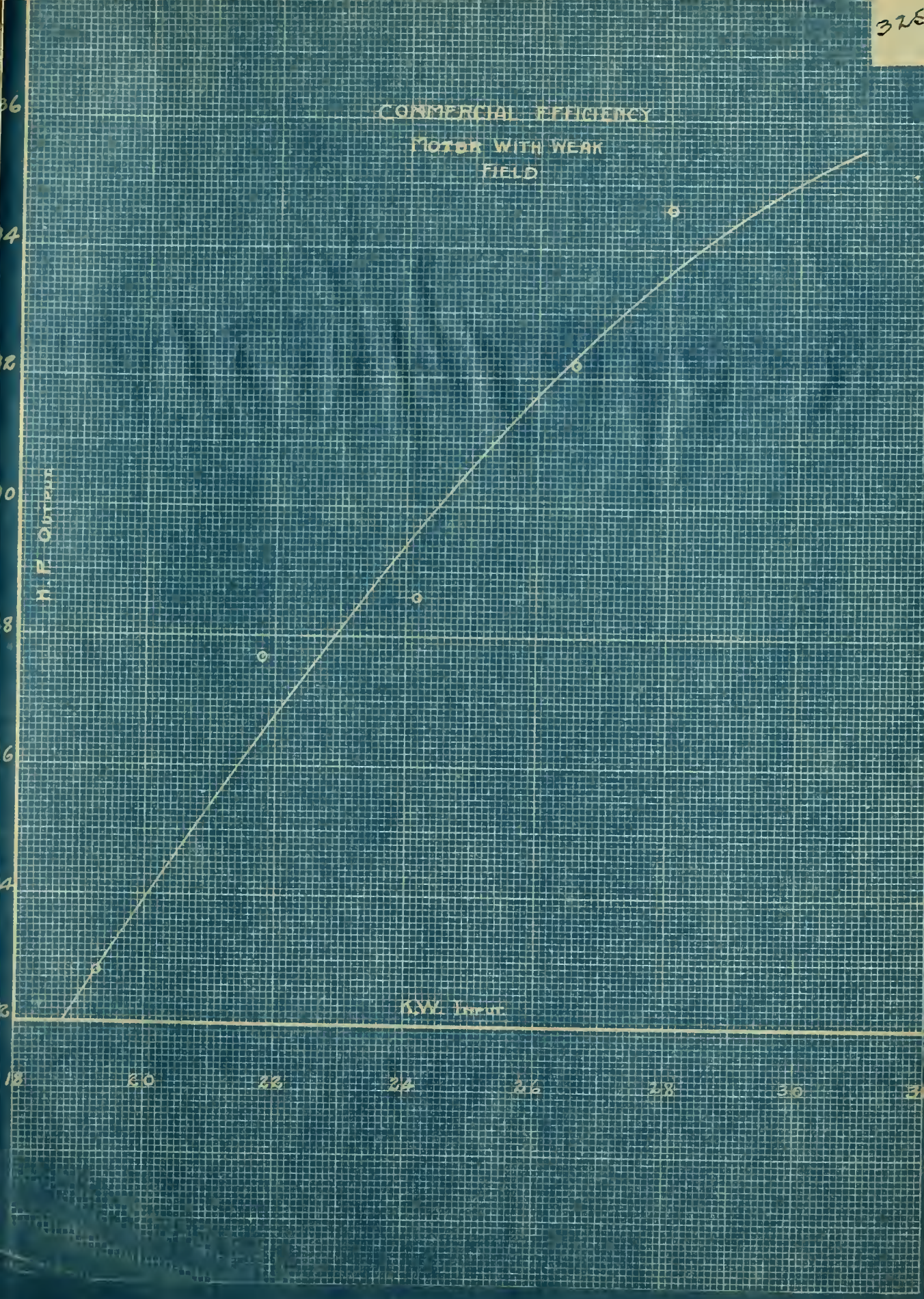

RUN - D 18" PIPE
AIR THRU ORIFICE
HORIZONTAL DIAMETER
VELOCITY AT CIRCUMFERENCES
OF VARYING CIRCULAR AREAS
℄ 18" PIPE
38.0 = M.E.V.
VELOCITY AIR FEET PER SECOND
50
40
30
20
SQ. FEET. CROSS SECTION AREA PIPE
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
0
.2
.4
.6
.8
1.0
1.2
1.4
1.6
1.8

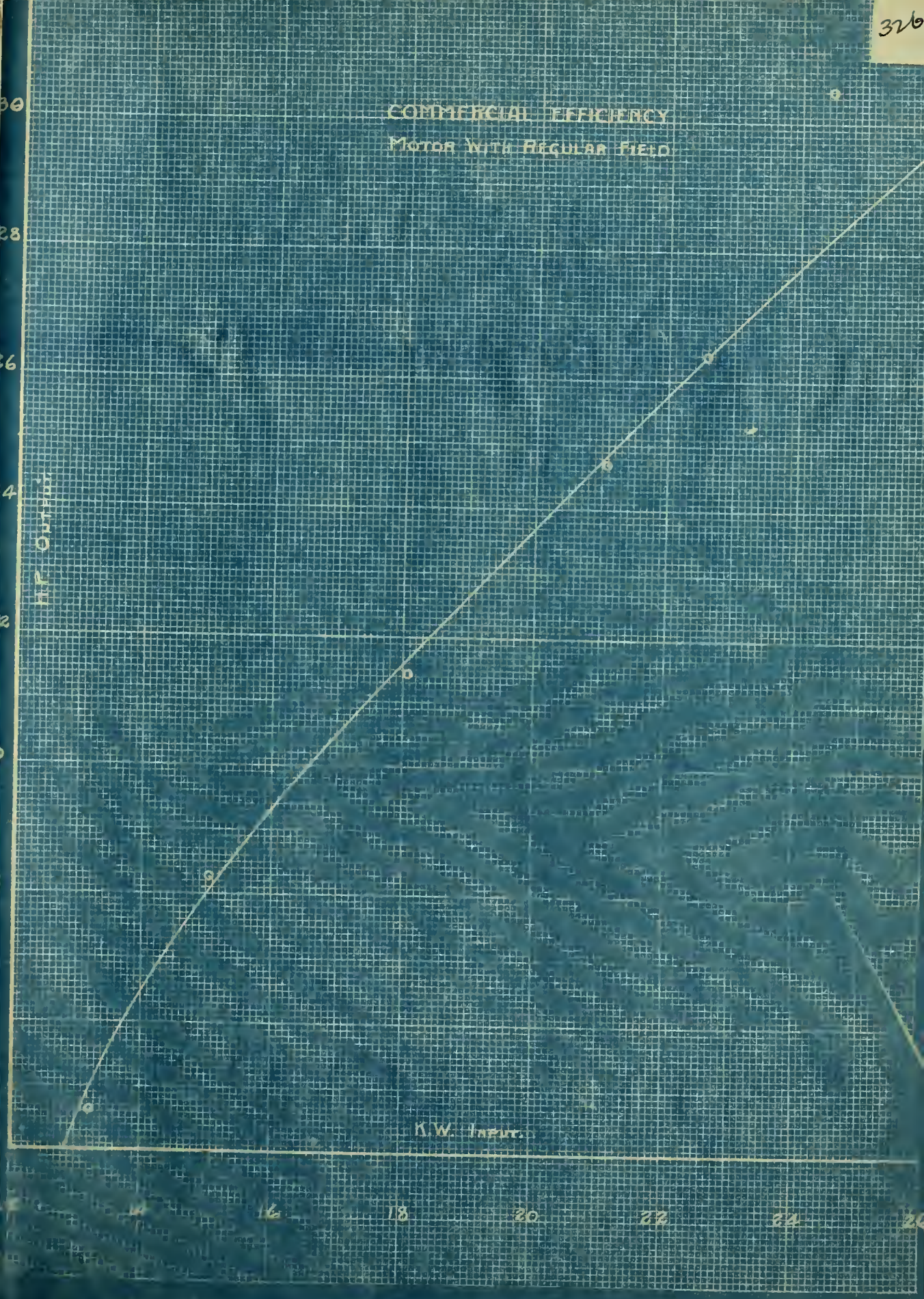

RUN - D 18" PIPE
AIR THRU ORIFICE
45° DIAMETER
VELOCITY AT CIRCUMFERENCES
OF VARYING CIRCULAR AREAS
38.6 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ FEET CROSS SECTION AREA PIPE
50
40
30
20
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.2
.4
.6
.8
1.0
1.2
1.4
1.6
1.8

322


RUN - D 18" PIPE
AIR THRU ORIFICE
.45° DIAMETER
VELOCITY AT CIRCUMFERENCES
OF VARYING CIRCULAR AREAS
.360 = M.E.V.
VELOCITY AIR FEET PER SECOND
SQ. FEET CROSS SECTION AREA PIPE
50
40
30
20
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.2
.4
.6
.8
1.0
1.2
1.4
1.6
1.8

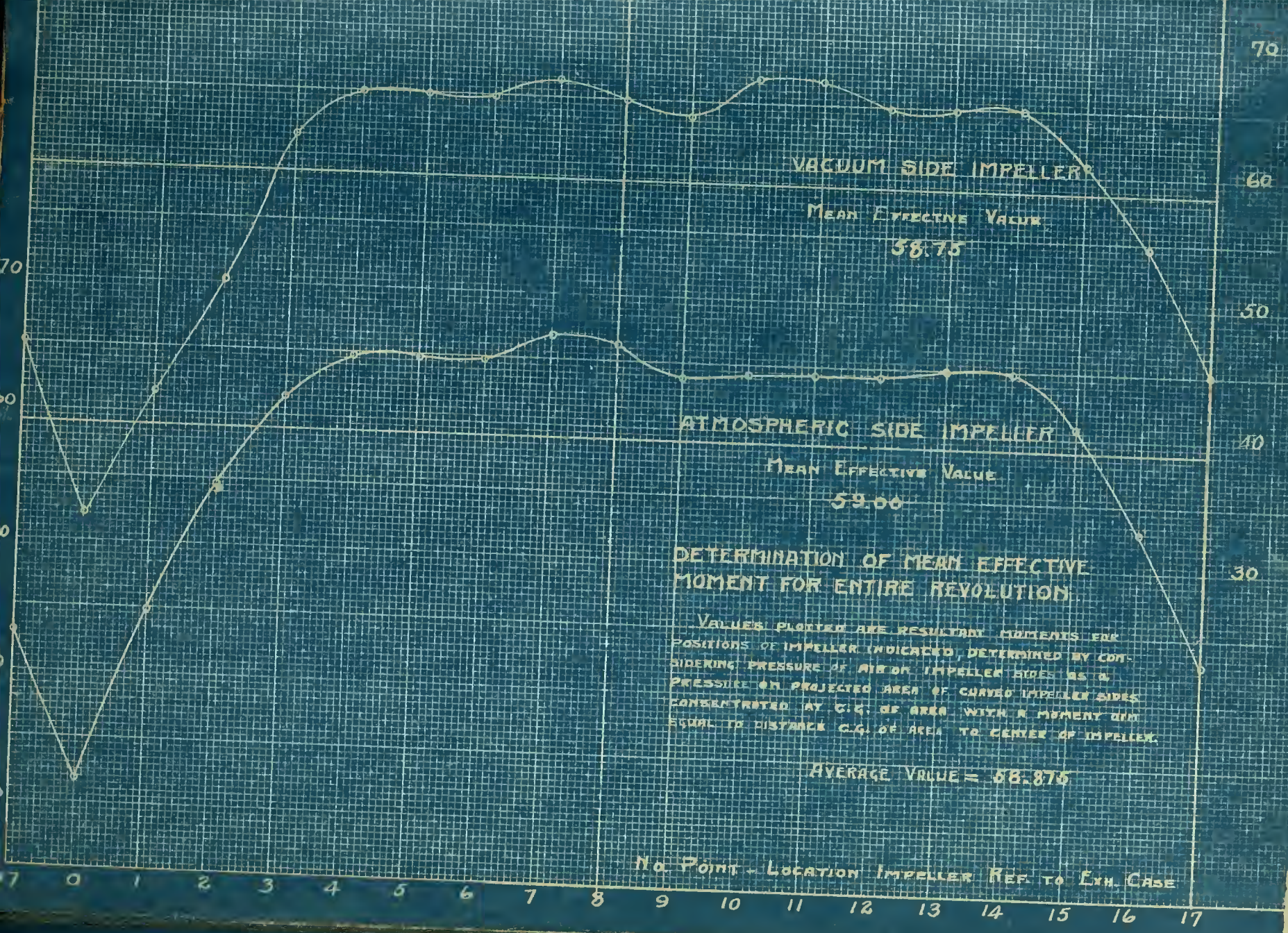

RUN - D 18" PIPE
AIR THRU ORIFICE
45° DIAMETER
VELOCITY AT CIRCUMFERENCES
OF VARYING CIRCULAR AREAS
℄ 18" PIPE
37.0 = M.E.V.
VELOCITY AIR FEET PER SECOND
50
40
30
20
SQ. FEET CROSS SECTION AREA PIPE
1.8
1.6
1.4
1.2
1.0
.8
.6
.4
.2
.2
.4
.6
.8
1.0
1.2
1.4
1.6
1.8

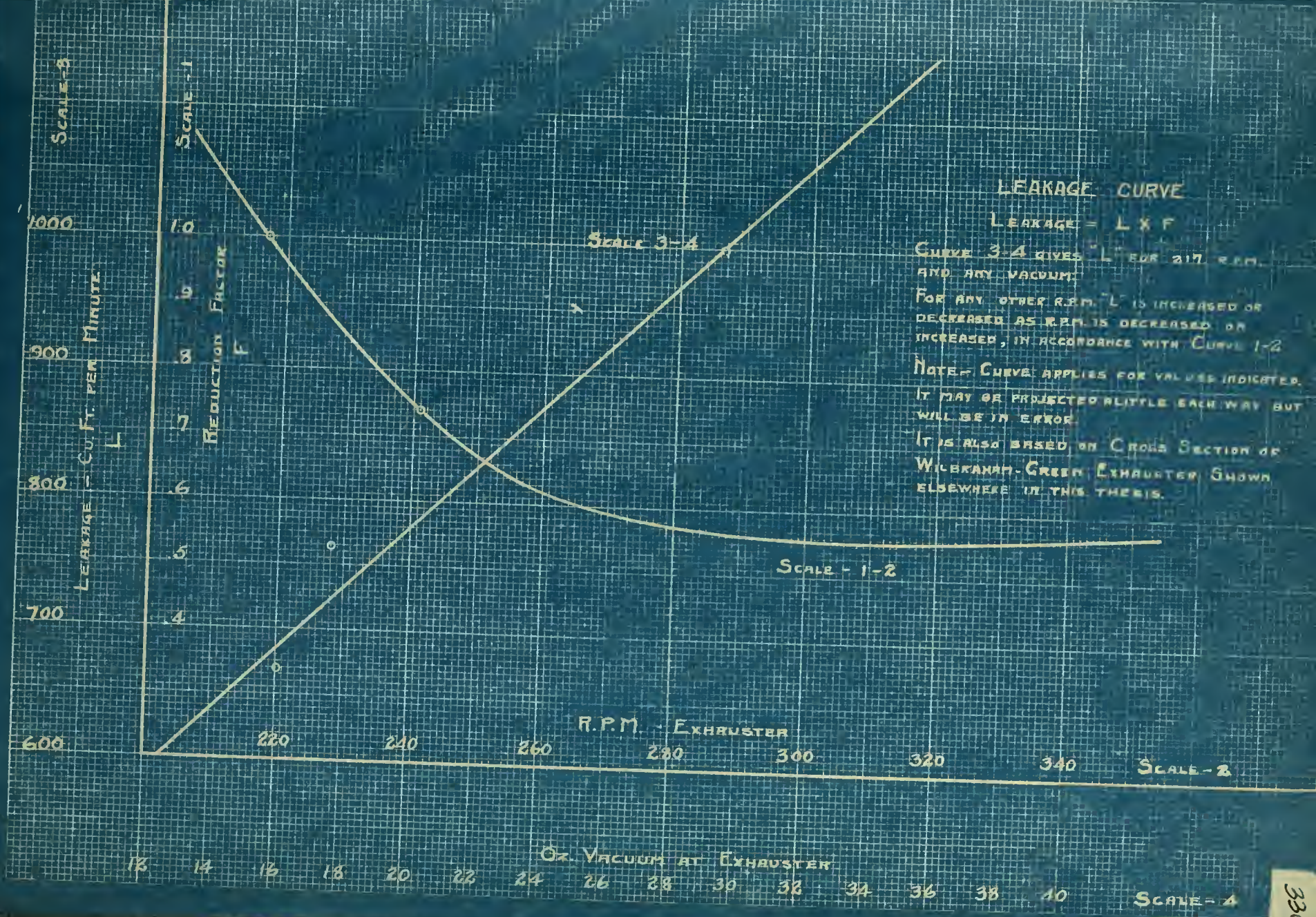

COMMERCIAL EFFICIENCY
MOTOR WITH WEAK FIELD
H.P. Output
K.W. Input
36
34
32
30
28
26
24
22
20
22
24
26
28
30

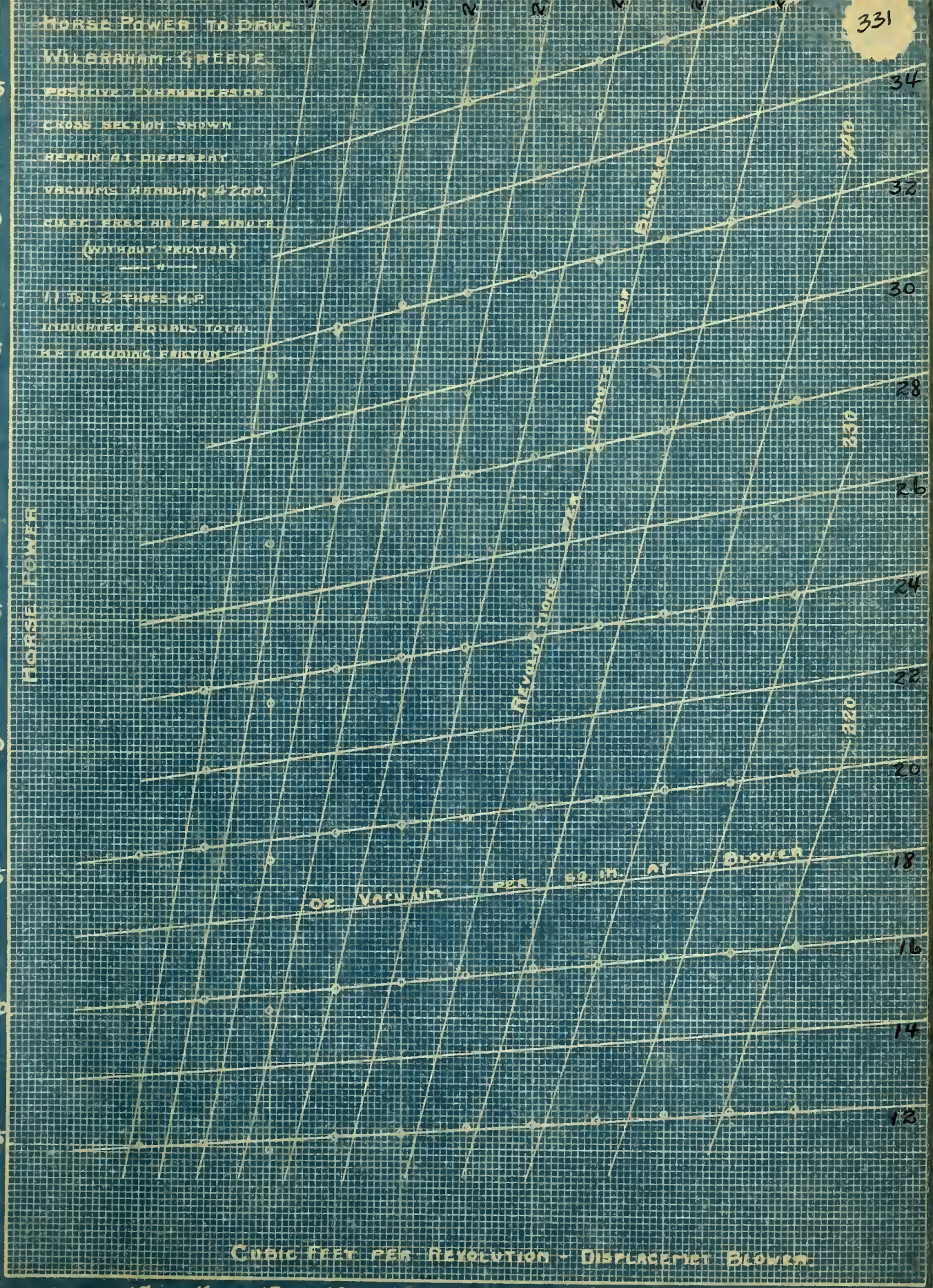

COMMERCIAL EFFICIENCY
MOTOR WITH REGULAR FIELD
H.P. OUTPUT
K.W. INPUT.
30
28
26
24
22
14
16
18
20
22
24

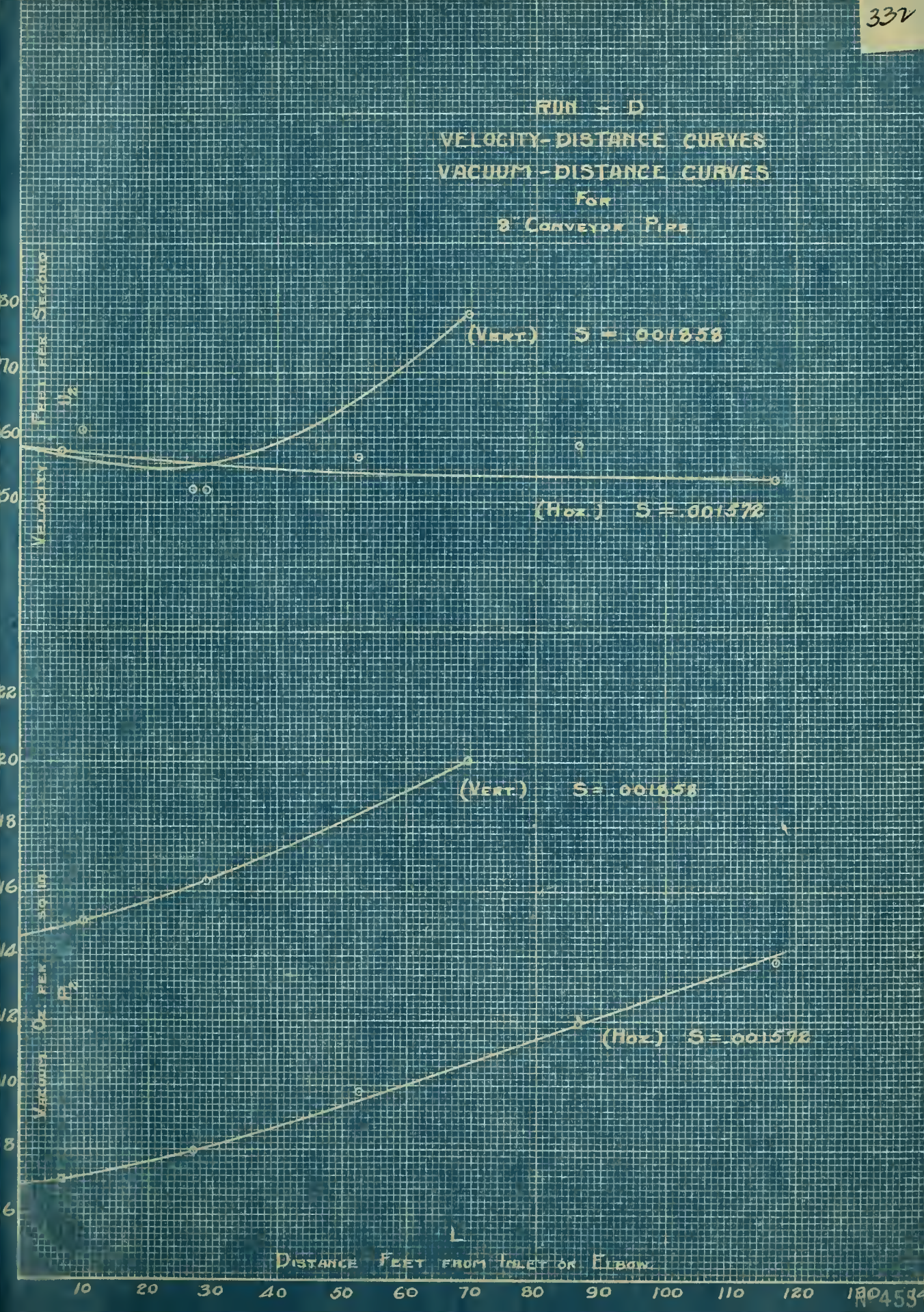
ATMOSPHERE
VACUUM
-6.750
+2.875
3.313
10.250
10.15
3.282
-4.812
+2.25
3.06
-8.300
+6.938
9.375
-4.150
-3.125
+8.250
9.500

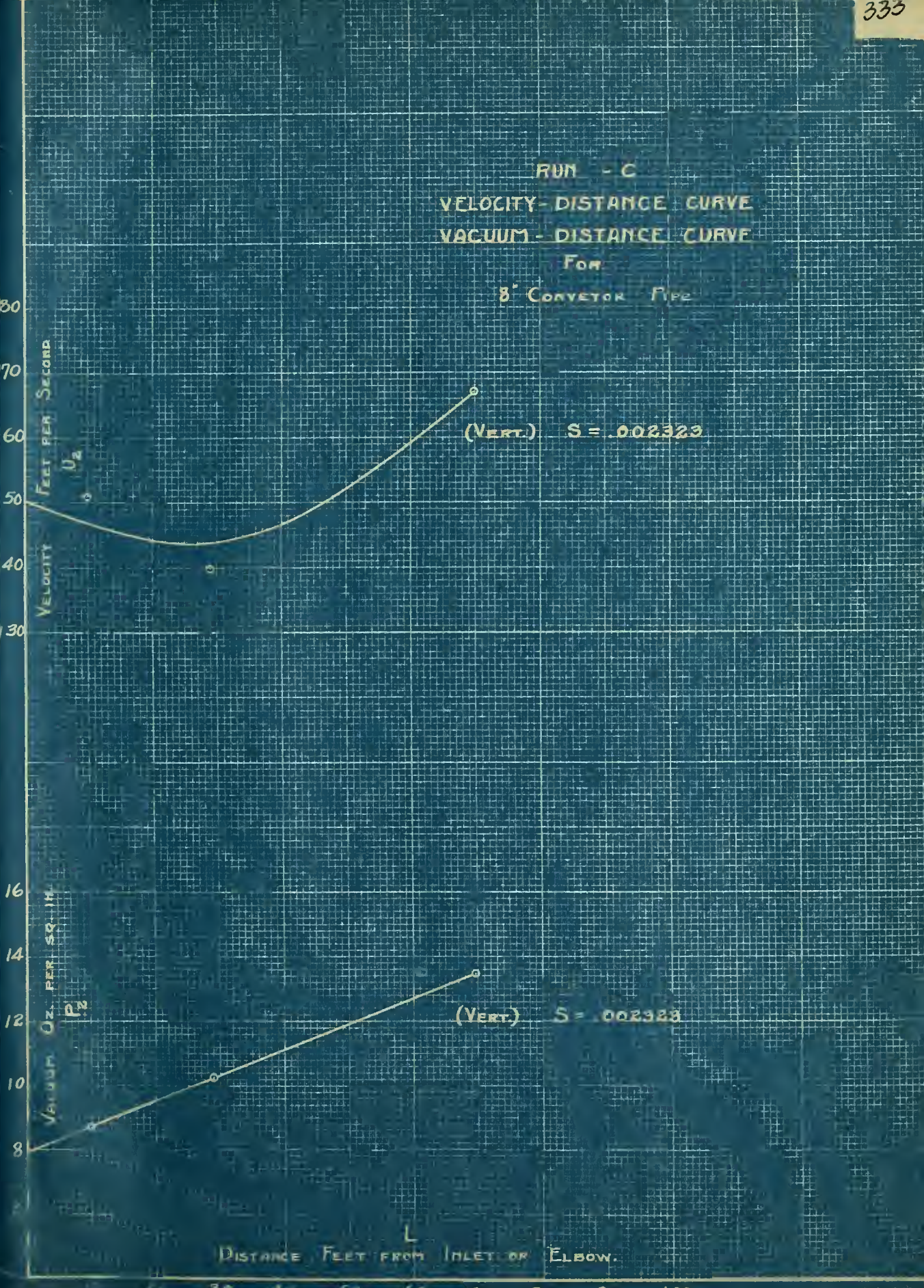
ATMOSPHERE
VACUUM
+3.875
-4.313
-3.038
11.687
11.687
-3.063
+4.375
-3.875
+5.375
-5.375
-2.687
-2.687
-8.250
+8.250
9.50
9.50

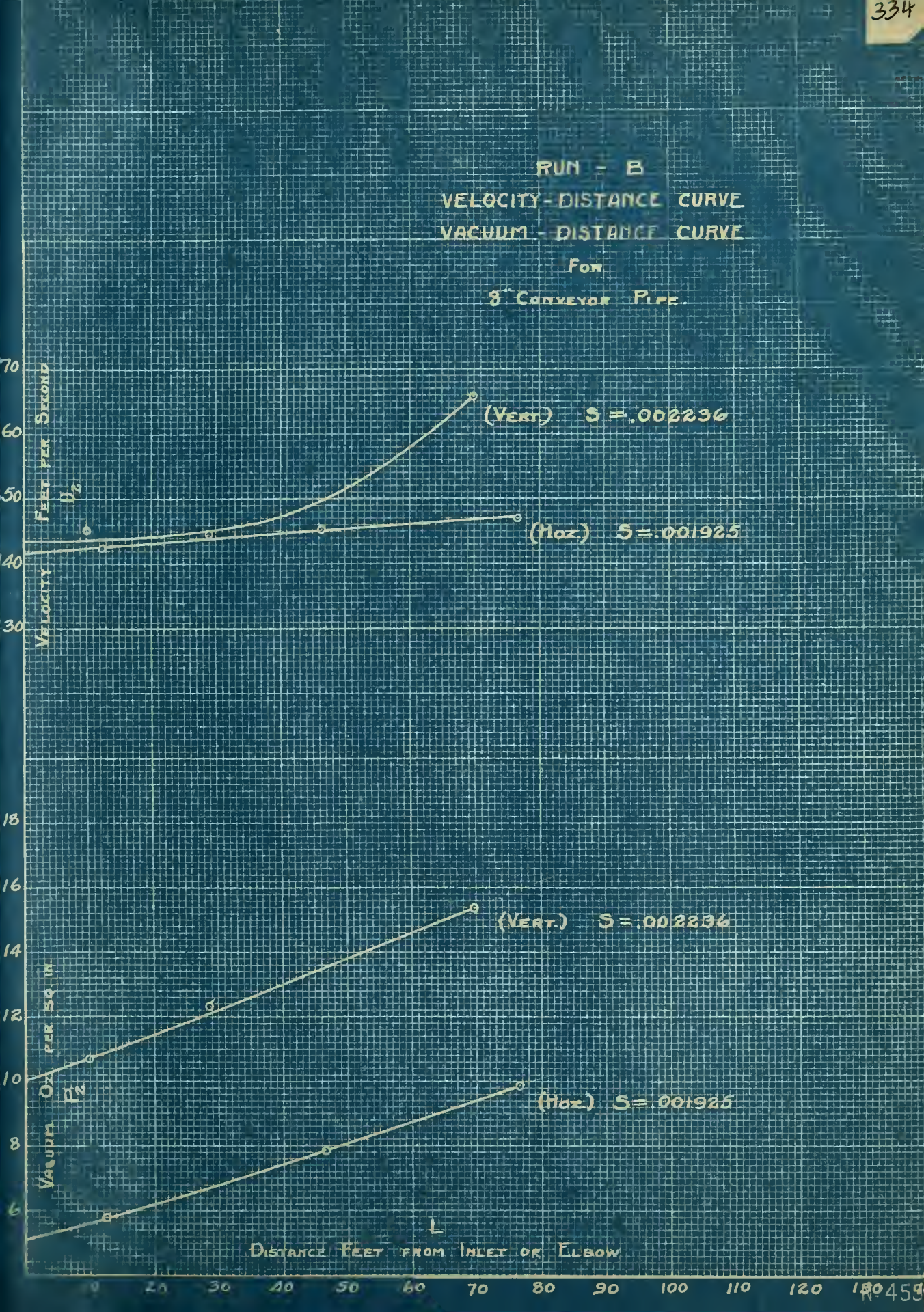

VACUUM SIDE IMPELLER
MEAN EFFECTIVE VALUE
58.75
ATMOSPHERIC SIDE IMPELLER
MEAN EFFECTIVE VALUE
59.00
DETERMINATION OF MEAN EFFECTIVE MOMENT FOR ENTIRE REVOLUTION
VALUES PLOTTED ARE RESULTANT MOMENTS FOR POSITIONS OF IMPELLER INDICATED, DETERMINED BY CONSIDERING PRESSURE OF AIR ON IMPELLER SIDES AS A PRESSURE ON PROJECTED AREA OF CURVED IMPELLER SIDES CONCENTRATED AT C.G. OF AREA WITH A MOMENT ARM EQUAL TO DISTANCE C.G. OF AREA TO CENTER OF IMPELLER.
AVERAGE VALUE = 58.875
NO. POINT - LOCATION IMPELLER REF. TO EXH. CASE
70
60
50
40
30
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17

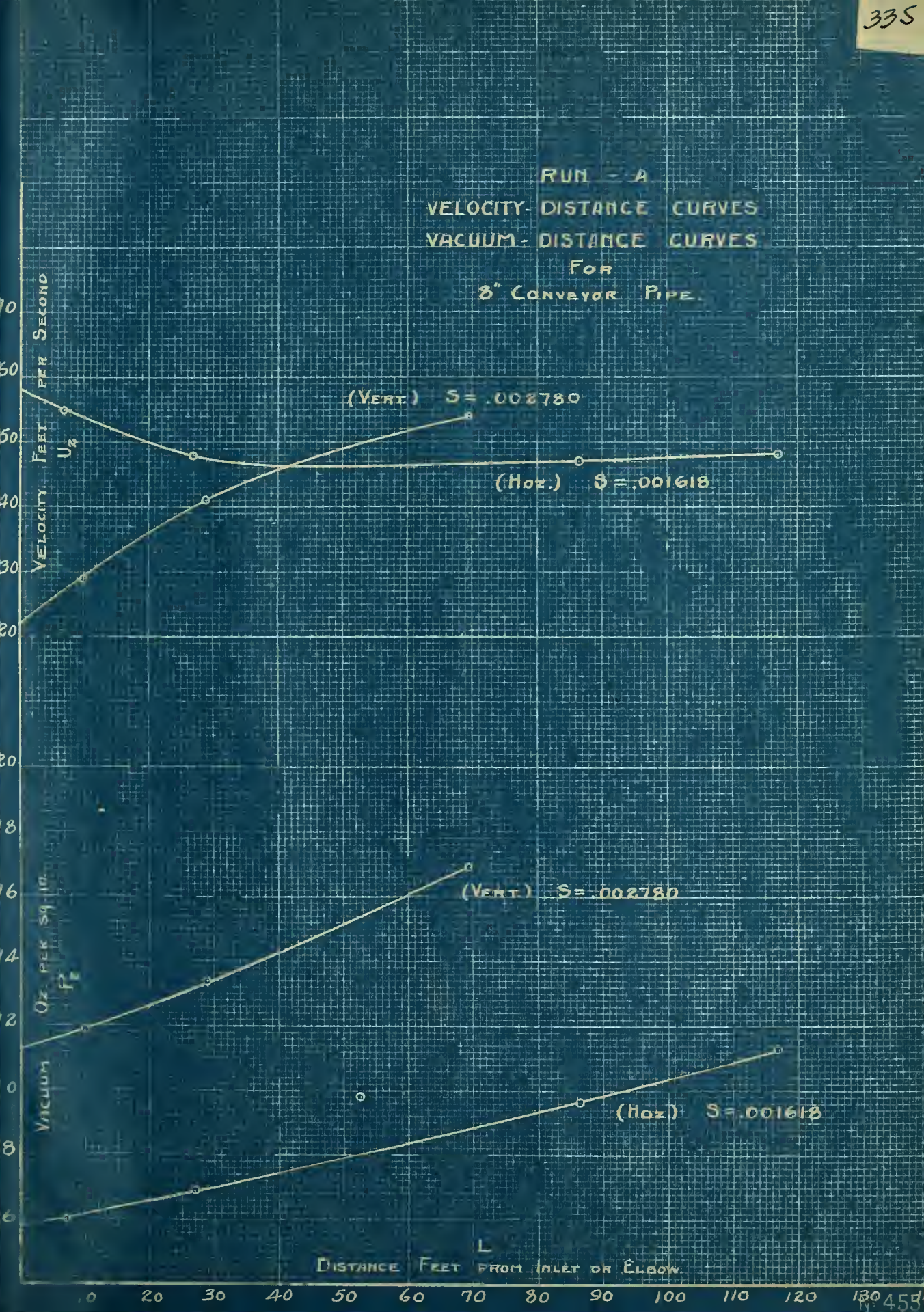

LEAKAGE CURVE
LEAKAGE = L X F
CURVE 3-4 GIVES "L" FOR 217 R.P.M. AND ANY VACUUM.
FOR ANY OTHER R.P.M. "L" IS INCREASED OR DECREASED AS R.P.M. IS DECREASED OR INCREASED, IN ACCORDANCE WITH CURVE 1-2
NOTE- CURVE APPLIES FOR VALUES INDICATED. IT MAY BE PROJECTED A LITTLE EACH WAY BUT WILL BE IN ERROR.
IT IS ALSO BASED ON CROSS SECTION OF WILBRAHAM-GREEN EXHAUSTER SHOWN ELSEWHERE IN THIS THESIS.
SCALE 3-4
SCALE - 1-2
SCALE-3
SCALE-1
LEAKAGE - CU. FT. PER MINUTE
L
REDUCTION FACTOR
F
1000
900
800
700
600
1.0
.9
.8
.7
.6
.5
.4
R.P.M. - EXHAUSTER
220
240
260
280
300
320
340
SCALE-2
OZ. VACUUM AT EXHAUSTER
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
SCALE-4

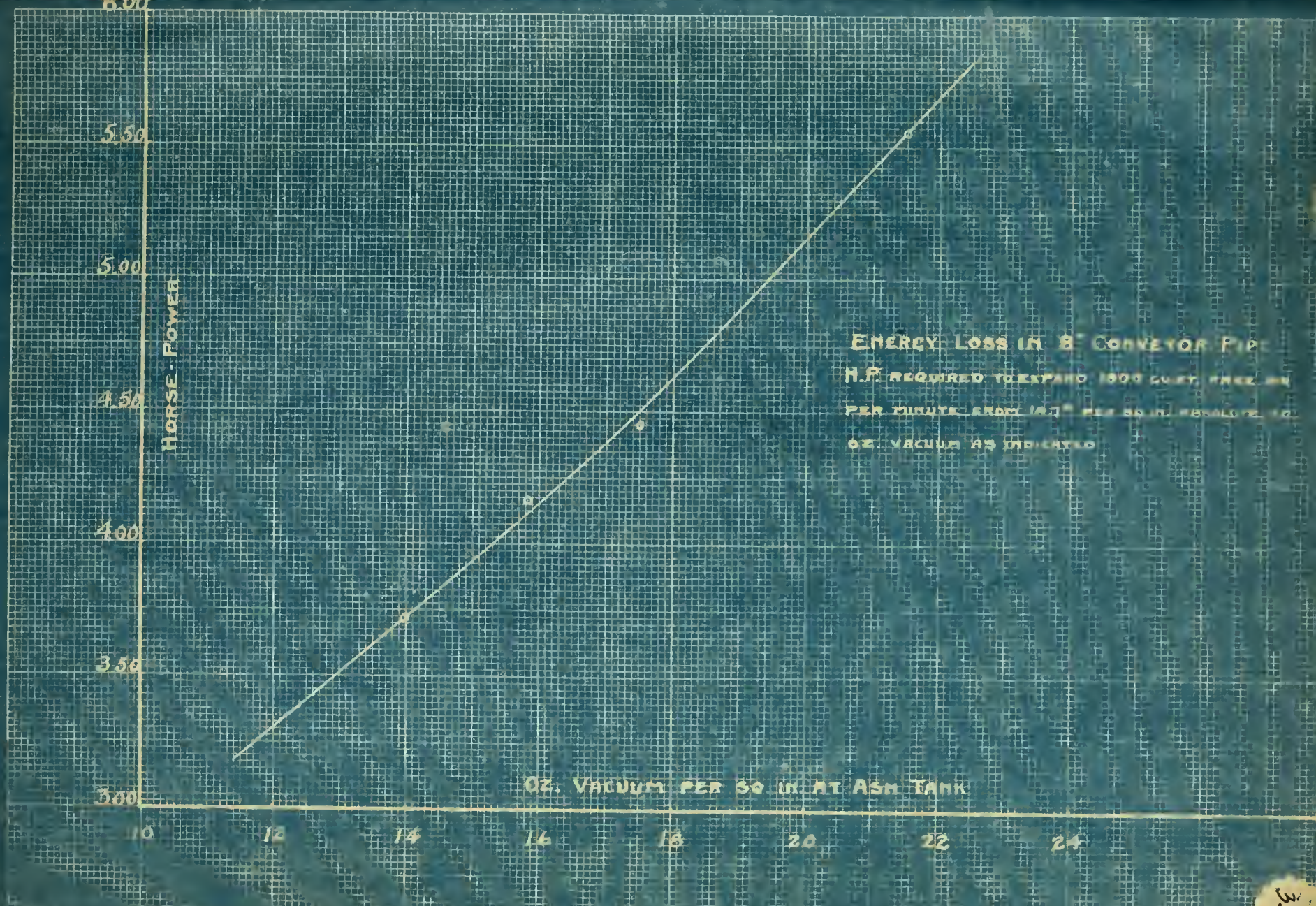

Horse Power to Drive
Wikgraham Greene
Positive Exhauster
Cross Section Shown
Series at Different
Vacuums Handling 4200
Cubic Feet Air per Minute
(Without Exciting)
At 1.3 Times Gas
Underneath Grubbs Motor
Not Including Friction
Horse Power
Revolutions per Minute Blower
Oz. Vacuum per Sq. In. at Blower
34
32
30
28
26
24
22
20
18
16
14
12
440
330
220
Cubic Feet per Revolution - Displacement Blower
15
16
17
18
19
20
21
22
23
24
25
№455

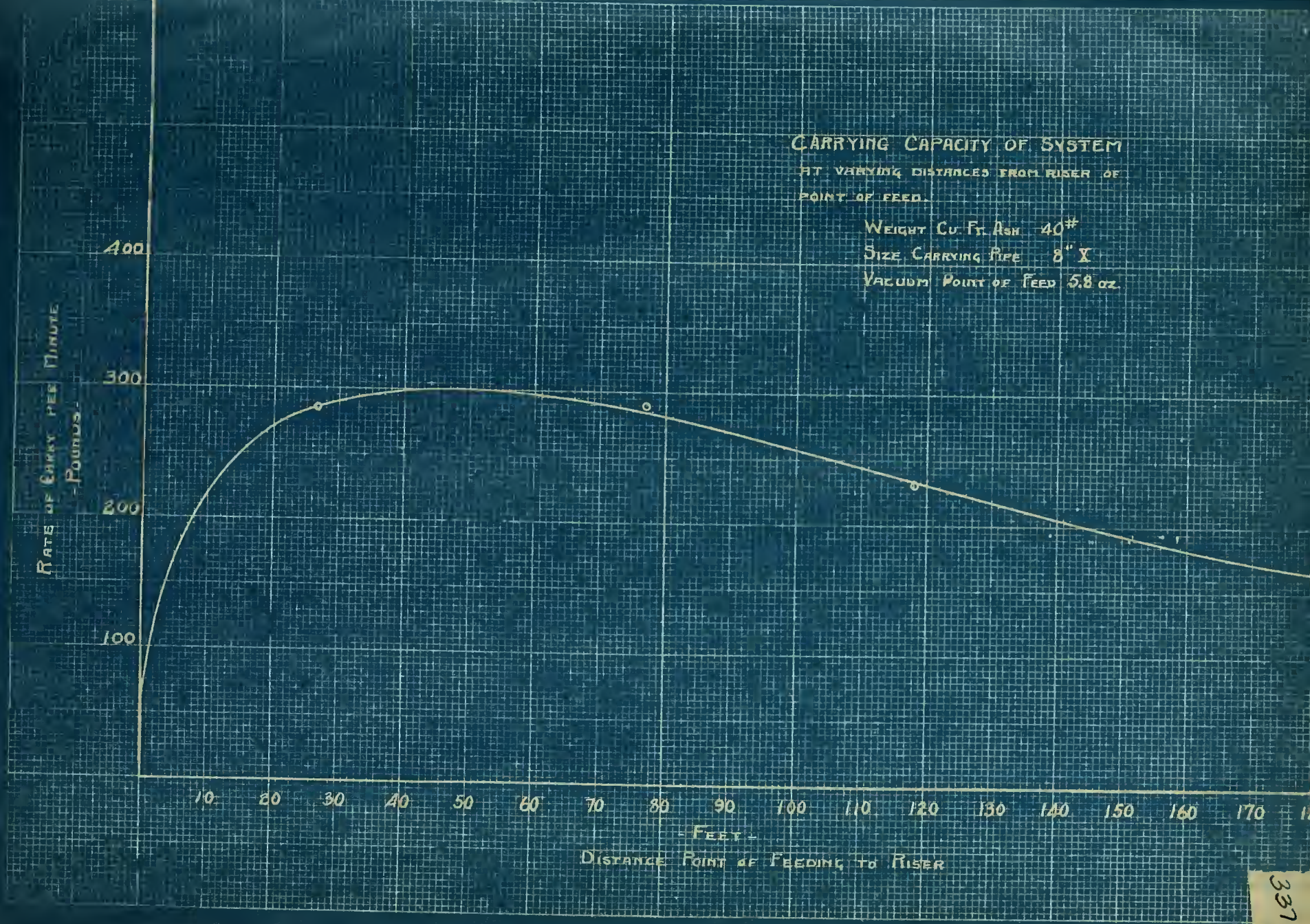

RUN - D
VELOCITY-DISTANCE CURVES
VACUUM-DISTANCE CURVES
FOR
8" CONVEYOR PIPE
VELOCITY FEET PER SECOND
(VERT) S = .001858
(HOR) S = .001572
VACUUM OF FEET WATER
(VERT) S = .001858
(HOR) S = .001572
DISTANCE FEET FROM INLET OR ELBOW
L
80
70
60
50
22
20
18
16
14
12
10
8
6
10
20
30
40
50
60
70
80
90
100
110
120
130


RUN - C
VELOCITY - DISTANCE CURVE
VACUUM - DISTANCE CURVE
FOR
8" CONVEYOR PIPE
VELOCITY FEET PER SECOND
U_2
(VERT.) S = .002323
VACUUM OZ. PER SQ. IN.
P_2
(VERT.) S = .002323
80
70
60
50
40
30
16
14
12
10
8
L
DISTANCE FEET FROM INLET OR ELBOW.
20
30
40
50
60
70
80
90
100


RUN - B
VELOCITY - DISTANCE CURVE
VACUUM - DISTANCE CURVE
FOR
8" CONVEYOR PIPE.
VELOCITY FEET PER SECOND
D_G
(VERT) S = .002236
(HOR.) S = .001925
VACUUM OZ. PER SQ. IN.
E_N
(VERT.) S = .002236
(HOR.) S = .001925
L
DISTANCE FEET FROM INLET OR ELBOW
70
60
50
40
30
18
16
14
12
10
8
6
0
20
30
40
50
60
70
80
90
100
110
120
130

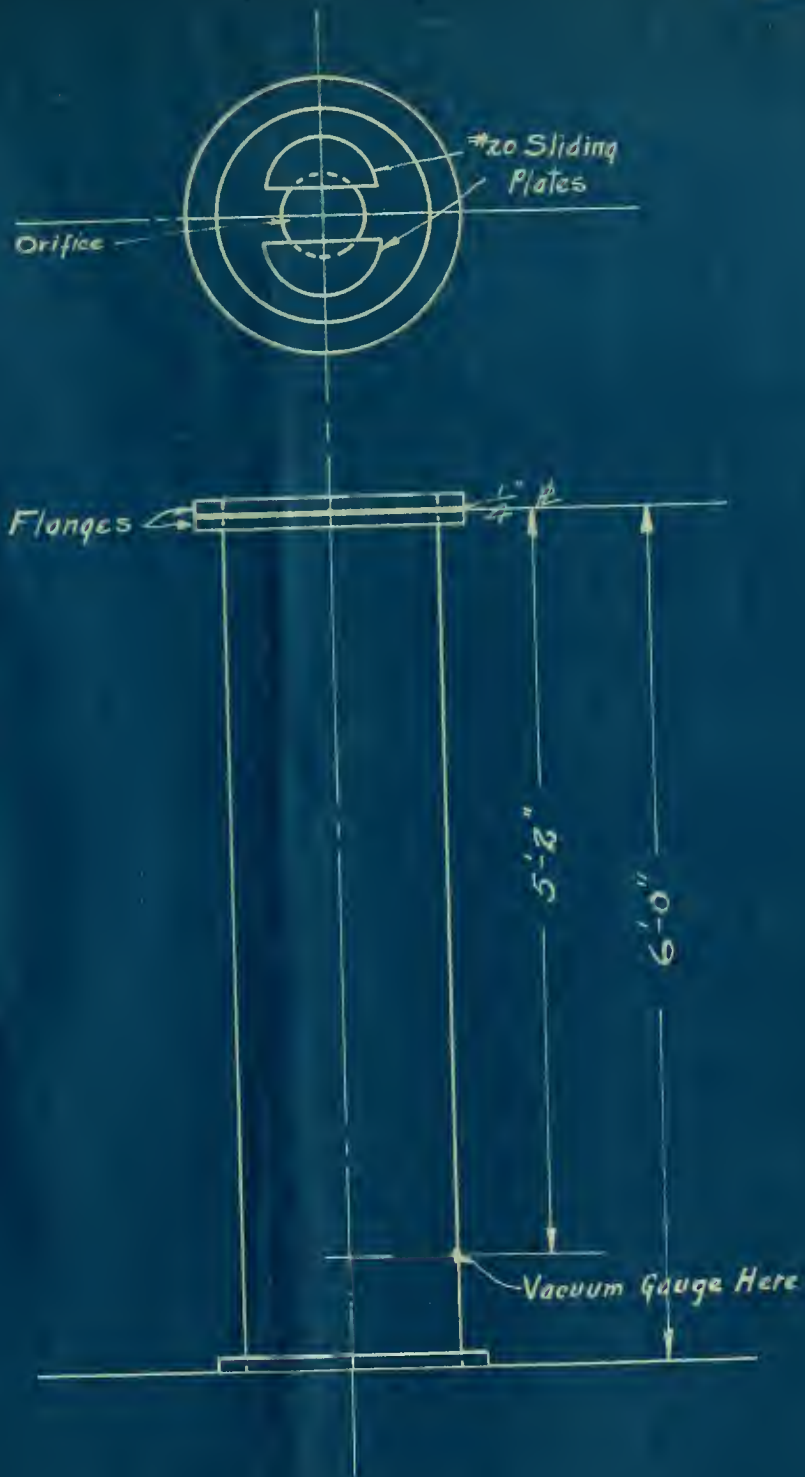

RUN - A
VELOCITY- DISTANCE CURVES
VACUUM- DISTANCE CURVES
FOR
8" CONVEYOR PIPE.
VELOCITY FEET PER SECOND
U_2
(VERT.) S= .002780
(HOR.) S=.001618
VACUUM OZ. PER SQ. IN.
P_2
(VERT.) S= .002780
(HOR.) S=.001618
DISTANCE FEET FROM INLET OR ELBOW.
L
10
60
50
40
30
20
20
18
16
14
12
10
8
6
0
20
30
40
50
60
70
80
90
100
110
120
130


ENERGY LOSS IN 8" CONVEYOR PIPE
H.P. REQUIRED TO EXPAND 1000 CU. FT. FREE AIR
PER MINUTE FROM 10.7# PER SQ. IN. ABSOLUTE TO
OZ. VACUUM AS INDICATED
HORSE-POWER
6.00
5.50
5.00
4.50
4.00
3.50
3.00
OZ. VACUUM PER SQ. IN. AT ASH TANK
10
12
14
16
18
20
22
24


CARRYING CAPACITY OF SYSTEM
AT VARYING DISTANCES FROM RISER OF POINT OF FEED.
WEIGHT CU. FT. ASH 40#
SIZE CARRYING PIPE 8" X
VACUUM POINT OF FEED 5.8 oz.
RATE OF CARRY PER MINUTE
-POUNDS-
400
300
200
100
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
-FEET-
DISTANCE POINT OF FEEDING TO RISER

ARRANGEMENT ASH SUPPORTING TABLE FOR FEED OF ASH.

WIRING DIAGRAM. MOTOR.



ORIFICE DISCHARGE APPARATUS.

T 26875
q621.183 St8

Strong, A. P.

Test of a pneumatic ash handling system

DEMCO-216

T
q621.183 26875 St8

Armour Institute of Technology
Library
CHICAGO, ILL.

FOR USE IN
LIBRARY ONLY

DEMCO